The Builder.

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The Proposed Addition to Westminster Abbey.

WE did not fail to note the announcement made a short time since in the daily papers that a Bill would be submitted to the House of Commons during the ensuing session to provide for the erection and maintenance of a monumental chapel in connexion with Westminster Abbey. The idea of such a chapel was a good deal discussed in our columns in 1884, when two or three plans and suggestions were published, and a correspondence on the subject was initiated by a letter from Mr. Fergusson, accompanied by a plan of his own for the proposed addition, which was intended as an improvement on a suggestion of Sir Gilbert Scott's, previously published in a sketch form in the *Pall Mall Gazette*. Fergusson's letter, with the plan attached, will be found in the *Builder* for February 16, 1884, and in the issue for February 23 of the same year we published a letter from Mr. Somers Clarke, protesting against the scheme on archæological grounds, and accompanied by a plan showing the amount of remains or traces of ancient Mediæval buildings which would be interfered with or demolished in carrying out the scheme. This was followed by a reply from Mr. Fergusson (March 1, 1884), and other correspondence, in which Mr. Clarke, Mr. Oldrid Scott, and others, took part, on March 8, winding up with a final letter from Mr. Fergusson on March 15. The opinions and arguments for and against the scheme, expressed in these letters, were of some interest and importance, and we have, therefore, given the dates, for any one who wishes to refer to them.

Concerning the wording and provisions of the proposed Bill we have no criticism to make; it is a business-like document, not concerning itself with any architectural questions, but making provision for the constitution of a Commission with perpetual succession and a common seal, with power to acquire lands and erect thereon a chapel, and to transfer the same, with all rights, powers, &c., to the Dean and Chapter of Westminster. The provisions are general, and do not bind the proposed Commissioners to any special site or any architectural treatment; and, if it is admitted that an addition of the kind proposed is desirable, there is nothing in the form of the Bill to call for criticism from an architectural point of view. We may merely mention that the Commissioners proposed are the Dean of Westminster, the Rev. Canon Farrar, the Duke of Westminster, Lord Wantage, Mr. G. Cubitt, Mr. G. Shaw-Lefevre, Mr. Bertram Woodhouse Currie, Mr. Henry Hucks Gibbs, "and such other persons as shall be appointed by her Majesty's Government."

From a letter of the Dean of Westminster which appeared in Tuesday's *Times*, however, it is evident that the scheme contemplated, though not specifically described in the Bill, is substantially the same which has been previously discussed in our columns,—viz., the erection of what has been described (in very misleading terms) as a new "south transept" to the Abbey; but which is, in fact, a very large, nearly separate, building tacked on at the eastern face of the Chapter-house, and extending southwards nearly at right angles to the Abbey Church. The question as to the advisability of such an addition for the purpose contemplated,—the provision of further space for the erection of national monuments in or in connexion with the Abbey,—presents itself in this case under two aspects, archæological and architectural, which it is more convenient to consider separately.

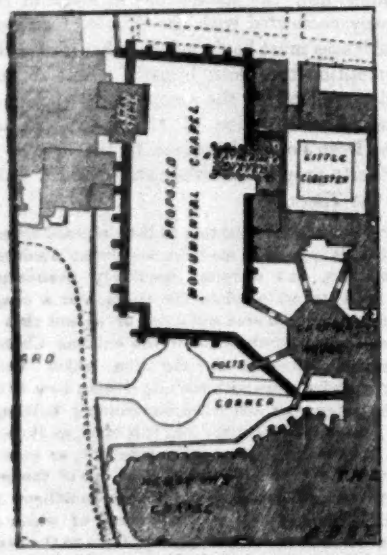
The archæological objection to the scheme proposed is that which has already been formulated in our columns by Mr. Somers Clarke in his letter of February 23, 1884, above referred to. It is that the new building, in all the forms in which it has been proposed, would obliterate various relics, of no little historical interest, of mediæval buildings which formerly constituted part of the Abbey precincts. The most important of these are the remains of St. Catherine's Chapel, on the east side of the Little Cloister, and the Infirmary Hall. Mr. Clarke includes among remains that would be obliterated the slype leading from the Little Cloister to the College Garden, in continuation of the line of the east walk of the Little Cloister; but he has made rather the worst of the case, as the new chapel could certainly be carried out on the proposed scheme, with a very little modification in the position of its western wall, without interfering with this or with the east walk of the Little Cloister. Speaking generally, however, the scheme would involve, no doubt, a general trampling out of the history and relics of this portion of the Abbey precinct, as well as the demolition of several houses now the habitations of some of the clergy connected with the Abbey, for whom residences must be found elsewhere; and this demolition the Dean himself seems to consider as involving the practical destruction or serious modification of the Little Cloister. The Dean's own objections to the scheme as hitherto proposed are thus stated in his letter to the *Times*:—

"My own one objection to the proposed scheme is that it appears to me to be somewhat needlessly ambitious, and therefore needlessly destructive. It seems to contemplate the erection of a chapel whose superficial area will equal or exceed that of the whole western limb of the existing Church, involving therefore an elevation which would seriously interfere with the magnificent view of the Abbey towering above the surrounding buildings, as seen from the south. But it is open, as it seems to me, to a still more grave objection, as necessitating the practical destruction of one of the most interesting portions of the Abbey buildings, the Little Cloister, some of the houses of which are scheduled in the Bill. The objections to the demolition of these houses, whether based on practical or on archæological grounds, seem to me, I confess, to grow stronger on every inspection of the site, or consideration of the question. It seems to be the one feature in the Bill which will provoke the entirely disinterested opposition of many whose sympathy and co-operation would be invaluable."

The answer which was made by Fergusson to the archæological objections was that, while he would be the last to interfere unnecessarily with any relic of old building, he did not consider that the historic or archæological value of the remains on the site was such as ought to interfere with a great modern architectural scheme, which was practically required for providing space for further national monuments in connexion with the great church which has for so many generations been regarded as the most fitting resting-place for those whose memory the nation has delighted to honour. And if the scheme were in other respects a satisfactory one, we should be disposed to acquiesce in this argument. But there are various other considerations which go to weaken it very much.

The plan as proposed by Fergusson was intended as an improvement on the original suggestion of Sir Gilbert Scott, inasmuch as the latter proposed a kind of new "Westminster Hall," a separate and very large building, the site of which was to be provided for, partly, by pulling down all the houses in Abingdon-street, towards which the new building was to face. The special point of Fergusson's plan was that the new building

should not be separate from, but connected with and entered from, the Abbey. As a separate building, he argued, a mere Act of Parliament or public decision that interment there should be equivalent to interment in the Abbey would avail nothing so far as the sentiment of the matter was concerned. He planned a somewhat less ambitious building, but still a portentously large one, with an ante-chapel very cleverly fitted in between the two easternmost flying buttresses of the Chapter-house, and entered from the Abbey under the Chapter-house buttresses; the ante-chapel was to have its greatest length east and west, and from its south side was to extend the large monumental chapel, having its greatest length north and south, and extending southwards to the boundary of College Gardens; the width of the monumental chapel corresponding with the length of the ante-chapel, which forms a kind of narthex to it. The architectural connexion with the existing building was to be formed by the ante-chapel, which was the articulating member, so to speak, in the connexion; and this is as well managed on plan as it well could be under the circumstances. The accompanying cut, a reproduc-



Proposed Monumental Chapel to be attached to Westminster Abbey.—(From a portion of a plan published in the "Nineteenth Century.")

tion of part of a plan published in connexion with Mr. Shaw-Lefevre's recent article in the *Nineteenth Century*, shows roughly, we presume, the scheme as now proposed, and forms a characteristic illustration of the difference between an architectural and a non-architectural plan. In this case, it will be seen, there is not a pretext of an attempt to join the old and new plans in an architectural manner; there is no architectural combination of the two; the buttresses of the Chapter House are left sticking out through the new walls in the most absurd and accidental fashion. It can hardly be supposed that it would in any case be allowed to be carried out in this way; but the plan is highly characteristic of the kind of illustrations which are produced by the amateur architectural lights who now come forward as the advisers and instructors of the public and of Parliament in these matters. Like the plan of Hyde Park Corner, it is the plan of a bungler who has not the most elementary idea of architectural design or arrangement, and who apparently is desirous to leave his mark on London in as many architectural blunders as an ignorant and indifferent public and Parliament will allow him money for. As a proof of the total want of any kind of architectural principle which underlies Mr. Shaw-Lefevre's efforts at architectural improvement, it may be observed that while in the so-called restoration at Westminster Hall it was his particular boast that he had got structures rebuilt on their ancient foundations, this Westminster Abbey scheme, on the other hand, is to be carried out in defiance and obliteration of ancient remains. If ancient foundations are of such sacred value on one side of the road, how is it that they lose all their value on the other side?

However, that is a point for archæological opponents, and we make them a present of it. Our present consideration is, what will be the architectural effect of a building added to Westminster Abbey on this scale and in this manner? And thereupon our decided opinion is that, both in regard to the scale and position of the proposed building, the architectural effect will be very unsatisfactory. It is proposed to connect a building as large as the nave of the Abbey with the latter, not in any centralised manner, not in any such way as to produce an architectural climax of any kind, and to help and carry on the design of the existing building, but to *hinge* it on, so to speak, to an angle of the Abbey plan (not even at a right angle), at a part of the ancient building where there is no *point d'appui* in the plan for the abutting of such a new mass of building, and where access to it from the ancient interior with which it is to be connected is only to be gained in a round-the-corner sort of fashion, by a narrow aisle winding under the flying buttresses of the nave. Such a manner of joining a new building to an existing building is eminently unarchitectural. Moreover, the new building, from the size proposed for it on plan, must either be very low and squat in proportion, or it must be of such scale in elevation as to rival the Abbey, instead of being in subordination to it; and the manner in which it is proposed to place it in reference to the Abbey will render it in that case the more obtrusive; it will be a kind of question whether the Abbey is part of the chapel, or the chapel a part of the Abbey. This will be more especially the case owing to the fact that the position in which it is proposed to place the new building is immediately adjoining the most delicate and ornate portion of the Abbey architecture, which must inevitably appear dwarfed and crushed in comparison. The Dean of Westminster, in his beforementioned letter, uses the argument that the proposed new chapel is "to form an integral portion of the Abbey Church, in the same manner and to the same degree as Henry VII.'s Chapel, the exceeding interest of which is in no way diminished by its being a separate building, of another age and another style of architecture to the church of Henry III. It is to be connected with the interior of the Abbey by a vestibule winding round the eastern exterior of the Chapter-house—a vestibule itself, it is to be hoped, so constructed as to form a worthy approach to a structure in entire harmony with the stately buildings in whose immediate vicinity it would stand." Now it is really too absurd to talk as if a building tacked on at an accidental kind of angle, could by any possibility form "an integral part of the building" in the same way that Henry VII.'s Chapel is. Henry VII.'s Chapel is on the axis of the main building, and in entire conformity with it as regards plan. Here is a thing which is a mere excrescence on the existing plan, having no logical relation to it whatever; you cannot make that a part of the ancient church in the sense that Henry VII.'s Chapel is. As to the desire for "a worthy approach" to the new chapel, the Dean may well ask for that, but he will not get it on the plan as now propounded to the public. An access more totally without dignity, or even common convenience, than that of a narrow aisle round the outside of the Chapter-house could hardly be imagined. But there is another consideration arising out of the proximity of the proposed building to Henry VII.'s Chapel. The latter is the richest and most ornate portion of the whole structure, and any new building to be brought into immediate proximity to it must of necessity (architecturally) be also of a rich and ornate character. A large *plain* building intruded at that point would have the worst possible effect with regard to *ensemble*; anything that is done there should be done in a sumptuous manner, and without counting cost or economising; and the adequate treatment in that sense of a building of the size proposed will cost a great deal more, probably, than any of the promoters of it are dreaming of.

There is a third question in connexion with the subject which we have not yet touched upon,—that of sentiment. The Dean of Westminster fully recognises the importance of this in his letter. He speaks of "the privilege of commemorating the great men of each successive generation in a spot which brings their memorials into close proximity with the far-reaching and unbroken memories of the whole history of our race." But, he adds, "of course, if such a privilege is of no value in the eyes of Englishmen, I have no more to say. The present Bill, or any analogous project, is waste paper, and the Abbey itself is merely a stately church encumbered with many tombs and disfigured with many monuments." Now the question will certainly occur to some persons (it was already put in our columns by Mr. Tarbuck, in the 1884 correspondence), will people have the same sentiment as to burials and monuments in a new chapel only connected in a rather round-about way with the Abbey, as they have had about burial in the Abbey? We rather doubt it. There has been for many generations, as Sir Lucius O'Trigger puts it, "very snug lying in the Abbey," but would it be thought equally so in a modern appendage of the kind proposed, more especially if it were (as we fear it would be) built with due regard to economy of cost? Is it not possible that the charm of sentiment and association connected with the idea of being memorialised in the Abbey would be broken?

Taking everything together, then, though we do not attach too much importance to the archæological consideration of the effacement of the ancient landmarks on the site proposed, we think that consideration, joined with the practical one of the unavoidable demolition of houses that are of some interest, and that cannot be so conveniently placed elsewhere, is sufficient to have considerable weight as against a scheme which will probably not be satisfactory in itself. If it were likely to be so, we should not weigh the old associations much in the scale; but it is in our judgment likely to be unsatisfactory in several ways; it will result in an architectural combination, awkward and ill-balanced, and injurious to the effect of the Abbey; there will probably not be enough money to be had to carry out so large a building in the sumptuous style which its position and purpose demand; and its connexion with the Abbey church will be by no means so close and intimate as to lead to its being generally regarded and felt to be a portion of the Abbey itself.

And this last consideration brings us to the suggestion which we should make in reply to the question, "What would you do?" for we by no means wish to enter into merely negative criticism. Our opinion is that the necessity for such a scheme has not yet arrived. The cloister at Westminster is a far more integral portion of the ancient building, both in regard to position and association, than any such new addition as that we have been speaking of can be considered, and our advice would be that before anything of the kind proposed is done, the cloister should be adopted as a Campo Santo. The objection that in this climate an open cloister would not be a suitable place for monuments is easily met; glaze the cloister windows. Of course, the cloister could not be available for monuments of such scale as many of those which have found place in the Abbey; but surely no one will regret that.* On the contrary, the necessity in such a case that a monument should be of a mural or bas-relief character would rather exercise a wholesome restraining influence on taste; and how beautiful and expressive a mural monument may be made, Mr. Gilbert has shown in Westminster Abbey itself, in his beautiful monument to Fawcett. Further-

* It should be added that the cloister is, we believe, already a good deal occupied with graves but not with monuments. The actual graves might be in the garth.

more, for monuments other than mural, and of a different kind, the cloister-garth itself might be used, though we should see that with more reluctance, and would rather say with George Sand, "Laissez la verdure."* Lastly, there is the further resource of forming a new cloister of a similar kind in the angle of the nave and north transept. The Dean refers to such a scheme, and objects that it would spoil the view of the Abbey from the north. We do not see the force of the objection. The north side of the nave is nearly all restored work, and not of the highest interest or beauty; but a more important point is that the insertion of a cloister, or a building of that nature, within the re-entering angle of nave and transepts, affords a perfectly rational and harmonious architectural combination; it can be made to group with, and appear part of, the general design, while being properly subordinated to the main building; while the manner in which it is proposed to tack on a large new building to an angle of the Chapter-house is architecturally unnatural; it must inevitably appear an after-thought and an excrescence. We may add that in either case, whether in the utilisation of the existing south cloister or the formation of a new north one, the cloisters, if glazed, could be thrown so completely into combination with the nave as to realise the feeling that they are part of the church, in a manner which could never be attained by the new chapel in the position proposed.

If it ever be indeed determined to build a Campo Santo, or consecrated Valhalla, in a manner worthy of the nation, the true place for it would be, however, not in an angle of the Abbey precinct, but on that now nearly waste piece of land, calling itself a public garden (and sometimes, it is true, occupied by a lounger or two or a stray nursemaid), at the south end of the Houses of Parliament. There might be built a grand temple of the honoured dead, overlooking the ancient Thames on whose banks the greatest capital in the world has clustered, and close to the great building which is the outward home and symbol of our national Government. Something grand, indeed, might be made out of that; but for such a project we must wait till Commissioners of Works are disestablished, and till modern English Parliaments learn the lesson, which ancient ones knew, that there is something greater and more glorious in the life of a nation than economy.

THE CENTRE OF FLORENCE.

BY AN ITALIAN ARCHITECT.†

THE Municipality of Florence had already decided, several years ago, to set in order the central part of the town, and thus demolish all that vast zone of ancient buildings, and change it, for hygienic motives, into large streets, with cleaner and more comfortable houses. The rectangle formed by the area to be demolished is comprised by the "Via Tornabuoni" at the north, "Via Calzaiuoli" at the south, "Via Cerretani" at the east, and "Via Porta Rossa" at the west.

The "Mercato Vecchio" forms the centre of this region, a spot which reminds one of the most primitive history of Florence. The history of this ancient part of the city is bound up with the history of Florence between the twelfth and fifteenth century, and is still represented to us by buildings which are in themselves proofs of the power and influence of their owners, and recall to us the families and persons who acted the principal parts in the leading events of Florentine history.

It is almost impossible to enumerate all the Mediæval monuments still existing in the large quarter of the "Mercato Vecchio." The Mediæval Florence of Dante's period still exists intact, as it was in his days; the streets narrow, winding, and having on both sides either stern-looking palaces or high towers, belonging either to the Guelf or Ghibelline nobles. It will suffice to mention the illustrious families of the Lamberti, Della Cosa, Sassetti, Amieri, Caponsacchi, Medici, Strozzi, Catellini, &c. Many of these families are mentioned by Dante in the XVIth Canto of the "Paradiso," where the poet records his meeting with Caccinguida, with whom he talks about the old Florentine nobility.

These are not the only facts that recall to us the buildings of that part of the town. The residences of the Arti della Séta, dei Linaiuòli, dei Medici e Speziàli, dei Beccai, and other monuments, are still there, and give testimony to the wise commercial and industrial organisation, the social and religious history, and the habits and customs of the ancient Florentine population.

I have myself (accompanied by the Government's Inspector of Excavations and Monuments, the learned Signor Carocci) found, although hidden and transformed by the modern plastering, all the Mediæval towers still existing in a good state of preservation. As a rule, the Mediæval buildings have survived well, except the last floors. None of the towers are as high as they used to be, and none preserve the Guelf's or Ghibellin's battlements, owing to the decree passed by the popular Government, prohibiting that the towers should be higher than 50 "braccia," hoping thus to restrain the building ambition of the nobles.

Both towers and palaces are built with a stone called "pietra forte," which used to be cut in blocks, keeping the external part unpolished, and this latter peculiarity greatly aids in giving that stern and severe aspect which belongs to the Mediæval Florentine architecture. Generally doors and windows are of a Gothic style, but a little modified. Many of the palaces are very interesting to architects, owing to their peculiar architectural character, their original and fine decorations, and their richness and good taste in ornaments.

Having now slightly alluded to the history of the quarter of "Mercato Vecchio," I will resume my account as to the project for reconstructing the centre of Florence.

When the Municipal project was announced by the public authorities, it was received with delight by many builders, engineers, constructors, and speculators,—in a word, by that class of people who are now invading every town of Italy, in eager search for gain, trampling and crushing everything, without troubling themselves about the memories and glories of Italy. These illiterate and uncultivated people, who only look to their own profit, would not hesitate to destroy the Colosseum, the Duomo of Florence, St. Peter's at the Vatican, and the Loggia dei Lanzi. It is deplorable to think that Italy does not take proper steps against these speculators. The Government only has any authority over the Municipalities, and ought to exert it in this case. Many persons have done their utmost, either through the press or private influence, to protest against the wretched project of the Municipality; the struggle has been long and vigorous, and, indeed, continues still, but against strength reason avails not, and the admirers of art and lovers of history have been doomed to disappointment after their vain complaints. The destruction of the "Mercato Vecchio," and of all the centre of Florence, will be a shame never to be forgotten by the members of the Florentine Municipality,—a shame which increases with the time, and future generations will in vain look for the noble monuments, reminding us of the past glories of Italy, which we have had the fortune of seeing,—will, instead, find modern galleries, covered by glass, badly proportioned porticoes, devoid of architectural principles; of which the modern Bourse forms an example. The ostensible object of the Municipality in setting in order the centre of Florence was that of sanitary improvement; but this end might very well have been attained without destroying so many historic palaces. It would have sufficed to have demolished the Ghetto quarter, composed of dirty narrow lanes, filthy little squares, and old, fœtid houses,—and in its place to form a large and fine garden, which would have been a great gain to the recreation and health of the population, and rendered the air purer.

The rest of the quarter of "Mercato Vecchio," which retains perfectly the characteristic Mediæval aspect, ought never to have been demolished. It would have been enough to have made a good drainage system, to give a copious supply of water, to shut up many narrow and dirty lanes, to reduce into courtyards many squares, and greatly diminish the number of poor people who live in that part of the town by building outside the town a workmen's quarter consisting of new, healthy, and cheap houses.

New streets might also have been opened, but only through those parts that are less ornamented with monuments and palaces, and the existing buildings could be utilised, restored, and made convenient and sightly; thus some streets of a thoroughly Mediæval Florentine character might have been obtained. These, and these only, are the works which require to be executed in the centre of Florence, and this opinion is shared by many Florentines who love their city and wish to guard its artistic treasures. We must repeat that the project presented to the Municipality does not provide for the practical wants of the town, and especially for those of the poorer classes; it is set on foot by speculators and *entrepreneurs* on the look out for their own advantage.

The demolitions have begun in the square of the "Mercato Vecchio," on the spot occupied by the ancient *forum vetus*, where once rose the ancient *capitolium*, adorned by temples and statues, and surrounded by very strong walls. The so-called column "Della Dovizia" (see illustrations in this number) has already been demolished; it was raised in the first half of the fourteenth century, and upon it stood Donatello's statue of the "Abbondanza" or "Dovizia." In 1721, the statue having been shattered by the frost, another one, by G. B. Foggini, was put in its place. Into this column two iron bars were fixed; one upheld the bell which gave the signal to the shopkeepers of the market when to open and when to close the shops, and the other was used as a pillory, and thieves were bound to it; according to Landucci's chronicles, this iron was fixed in the column on the 1st of June, 1504.

Up to now, no other monument has been destroyed, but shortly the "Loggia del Pesce" will be pulled down. This was built by Grand Duke Cosimo in 1568, and its architect was a certain Giorgio Vasari (see illustrations). This "loggia," of an elegant form, ornamented with bas-reliefs, representing various kinds of fish, supported by slender pillars, is an original and characteristic monument, if not of great artistic merit. It is now reduced to such a deplorable condition that it is a wonder it still stands.

To the eastern side of the "Piazza di Mercato Vecchio" is the Ghetto, which is now being demolished. It is a lurid, confused, and deformed mass of dirty, small houses, in which no ancient edifice is preserved to this day. Excavations have recently been executed on this spot by the Municipal Commission of Archæology, under the superintendence of Signor Carocci, and of Signor Landi, a municipal engineer.

The first researches were made in the "Piazza della Fonte," called "Piazza della Tosa" in the Middle Ages, near the ancient Capitolium; but nothing has been found except remnants and fragments of Mediæval buildings of the time of the Ghibellines, when, winners at the battle of Montaperti, they returned to Florence, and destroyed a great number of palaces and towers belonging to the Guelfs (1262-64).

The recent excavations in the "Via della Nave" brought to light an ancient Roman road, nearly four mètres wide, flanked by edifices of Roman origin, on which Mediæval buildings were raised later on. It is interesting to observe that the Roman road lately

* George Sand's last spoken words.

† We give this as the individual opinion of an Italian architect and archæologist, and probably representing the opinion of the more cultivated section of Italians of the present day, on the subject of the proposed "improvements" in the ancient central portion of Florence.

discovered is in the same direction as the first circuit of the walls of Florence. Unfortunately, the researches made on purpose to study the Mediæval history of this part of the town gave no satisfactory results, as might have been foreseen, it being well known that this part of the town, in which rose the palaces and towers of many noble Florentine families, such as the Brunelleschi, Della Tosa, Arrigucci, Medici, Tosinghi, &c., &c., underwent many transformations at various epochs, the principal of which took place in the sixteenth century, when this ample quadrangle of buildings was reduced into a Ghetto by the order of Cosimo dei Medici.

On the contrary, the western side of the "Piazza di Mercato Vecchio,"—where the residence "Dell' Arte dei Medici e Speziàli," the palace "Degli Amieri," and the "Tabernacolo di S. Maria della Tromba" still exist,—is most important.

The "Consoli dell' Arte dei Medici e Speziàli" did not, as all the other "Arti," erect a sumptuous building for their residence. They received from the Commune the tower belonging to the "Caponsacchi," a powerful family which came from "Fiesole," and raised an imposing fortress on this spot of the "Mercato," as expressly mentioned by Dante* ("Paradiso," canto xvi., v. 121).

Dante himself was incorporated in the "Arte dei Medici e Speziàli," when the reforms of the State, with a strictly popular intention, ordered all citizens to join one of the "Arti," or to be declared unable to fulfil Government commissions.

On one side of the tower, part of the "Palazzo degli Amieri" is visible; this family, composed of Ghibelline soldiers, always furnished brave champions to its country. Their ancient palace was dismantled by the Guelfs, who, after the battle of Montaperti, gradually regained the supreme power. "Foglia d' Amiero degli Amieri" having returned from exile, built, between 1280–1300, the now-existing palace, and a tower of a strong and fine construction, still visible in the modern "Piazza degli Amieri" (see illustrations). The "Oratorio di S. Maria della Tromba, or Tabernacolo di Mercato Vecchio," built in the thirteenth century, was given to be taken care of by "Arte dei Medici e Speziàli," which, as we have already said, had its residence near it. The chapel has been changed into a shop, and nothing is left of the shrine except a beautiful ornamented frieze of "pietra serena." Near the "Palazzo degli Amieri" rose the residence of "Arte dei Rigattieri e Linaiuòli" (brokers and flax-growers); this building is ornamented with a very beautiful door and a nicely-decorated architrave, bearing elegantly-sculptured armorial bearings on a field sprinkled with fleurs-de-lis (see illustrations). We learn from the manuscript chronicles, collected since ancient times by the "Consoli dell' Arte," that the building was commenced in 1413, and that many renowned artists, among whom we find the names of Donatello and Frate Angelico, worked at it. Nothing is preserved to this day in the interior of the edifice.

Of all the monuments cited up to now, only the "Colonna di Mercato Vecchio," called the "Dovizia," has ceased to exist.

Numberless other Mediæval monuments, important in an artistic and historical point of view, are scattered here and there in the old quarter of Florence; but my intention was to describe only those which are doomed to be shortly pulled down.

The ancient quarter of the "Mercato Vecchio," when cleansed, restored, and put in order, would have offered the faithful image of a Mediæval town, as Rome and Pompeii are samples of the Latin towns. Visitors could have walked in the old genuine Florentine city, in those very streets which Dante trod, in that city where the Guelf and Ghibelline factions fought against each other for centuries; the birth-place of many Florentines illustrious in science, letters, and arms; where so many conspiracies were plotted, and where one may say, without exaggeration, that every wall, every stone, records a page of Florentine history.

L. B.

* See also Browning, in "The Ring and the Book":—
"True Capoosacchi of old 'Head I' the Sack,'
That fought in Fiesole ere Florence was."
—Ed.

NOTES.

IN view of the collapse, as it appears for the present at all events, of the Panama Canal scheme, it may be well for those who may be called upon or be desirous to make another effort to carry it through, to consider the history of the progressive statements that have been made as to estimated cost and work to be done. The estimate for the Sea-level Canal, which was brought before the Paris Congress at the instance of M. Wyse, contemplated 46,150,000 cubic mètres of excavation, and a total outlay of 427,000,000 francs. In 1880, on a visit to Panama, M. de Lesseps estimated the excavation at 75,100,000 cubic mètres, costing 570,000,000 francs, the Chagres dam and the deviations of the rivers at 175,000,000 francs, and the total cost of the work, including 10 per cent. for contingencies, at 843,700,000 francs. This estimate, on Feb. 27, 1880, he reduced to 658,000,000 francs, and in the September following to 530,000,000 francs. In May, 1885, M. de Lesseps informed the Minister of the Interior that he would certainly finish the canal, on the level, for 1,070,000,000 francs. On Nov. 15, 1887, he stated to the Minister of Finance that he was going to introduce locks, and that the work would be completed for a total cost of 1,500,000,000 francs. In the report to the general meeting on March 1, 1888, this cost was raised to 1,700,000,000 francs. The aggregate amount of share capital and loan obligations amounted on January 1 last to 1,967,000,000 francs. Interest has now ceased to be paid, and in the *Bulletin du Canal Interocéanique* of Feb. 2, 1889, M. de Lesseps states that 450,000,000 francs are yet required to be spent in the execution of the works, without any allowance for interest. But the aggregate of 2,417,000,000 francs thus arrived at makes no allowance for the 100,000,000 francs which in 1886 were stated to be necessary for the Gamboa dam. The total cubic quantity of excavation, which in 1879 was estimated at 46,150,000 cubic mètres, and in 1880 at 75,000,000 cubic mètres, was stated, in a detailed estimate in the autumn of 1886, at 131,000,000 cubic mètres. On March 1, 1888, in his report to the shareholders, M. de Lesseps stated that by the introduction of the proposed locks the quantity of excavation then remaining to be completed would be reduced to 34,000,000 cubic mètres, or rather less than the quantity actually returned as excavated,—which, up to June 30, 1887, amounted to 37,174,000 cubic mètres. In his report of January 26, 1889, however, M. de Lesseps announced the abandonment of locks Nos. 5 and 6, and the consequent lowering of the summit-pond of the canal, as compared with the design adopted on March 1, 1888, by 36 ft. The excavation still necessary, therefore, he put at 35,000,000 cubic mètres, for the cost of which he allowed 181,500,000 francs, besides 25,000,000 francs for the provision of new material. The total cost of excavation, in the same report, he stated to have been 12 fr. 22 c. per cubic mètre for the average of the years 1884-85, 1885-86, and 1886-87.

FROM the printed report of the discussion at the Surveyors' Institution on Mr. Hunt's paper on Quantities, which has been forwarded to us by the Secretary as far as it has gone (for the discussion was adjourned), it appears that several of the speakers, although they maintain that the quantity-surveyor is working for the building owner, and should be paid by him, practically admit the view we have expressed that the quantities are really taken out for the contractor. Mr. Ashby said he "considered that the quantities were largely, if not primarily, for the convenience of the builder. The building-owner very seldom, if ever, saw the quantities, and the architect rarely saw them except in those cases where, at the close of the job, he chose to settle the extras and omissions without the intervention of the surveyor. Therefore it seemed that the convenience of the builder was the first object of the quantities, and that it was right it should be so." Further on, the same speaker remarked that "he thought that the history of quantities, so far as he could trace it, tended to the conclusion that the quantity-surveyor was, in the first place, the creation of the builder; else why did the payment of the quantity-surveyor by the builder survive? Why was he not paid directly by the building-owner?" In regard to the responsibility of the quantity-surveyor for inaccurate quantities, the same speaker remarked that "if an auctioneer sold a plot of land as being 100 acres, and it turned out to be only 90 acres, he was clearly responsible to the man to whom he sold." But then, as Mr. Rickman most truly said, the measuring-surveyor was dependent on the accuracy of the drawings and specifications which the architect supplied:—

"There were cases, no doubt, in which a perfect set of drawings and specifications were handed to the quantity surveyor to take his quantities from, and in such cases he could hardly believe that any responsible quantity-surveyor could make any serious error. The errors which occurred in the preparation of quantities (and there were such errors, greater or less, in every set of quantities) arose from the drawings not being perfect, from the specifications not being complete, from both being altered from time to time as the quantities were being prepared, from a larger amount of responsibility being thrown on the measuring-surveyor, and from there not being sufficient time allowed him, as was too often the case. What the quantity surveyor wanted was a set of working drawings and a specification such as an engineer would send out,—such as used to be furnished when he was in his articles,—careful working drawings with complete details, so that no question would arise in the course of the works, everything being thoroughly described by the specification and provided for in the quantities. With such material to work upon he could not understand any man of moderate education and fair knowledge of building construction making any serious mistake."

That is the plain sense of the matter, and there is do doubt that architects have created unnecessary difficulty by their frequent laxity and inaccuracy in specifying in these days. Mr. Rickman is to read a paper on "Specifications," at the Institute of Architects, on Monday, and perhaps we shall hear something more from him on this subject, which few people are more competent to treat.

M. SALOMON REINACH is certainly an archæologist of monumental courage. That invaluable paper, the *Classical Review*, calls attention in the February number (p. 83) to a task he has undertaken which might well appal the stoutest heart. Every one knows that in archæological work the great initial difficulty is access to published material. Few private scholars possess such works as the Roman "Monumenti Inediti," the "Comptes Rendus" of St. Petersburgh, or even the "Archæologische Zeitung." The market value of the back numbers of the "Monumenti," with text, is now over a hundred pounds, and even at that price a complete set is only occasionally obtainable when some well-furnished German archæologist is good enough to die, and his library is sold. M. Reinach proposes to republish at moderate price a series of these indispensable works, the series to be entitled "Bibliothèque des Monuments Figurés, Grecs et Romains," and the first of the series is actually out, *i.e.*, the "Voyage Archéologique en Grèce et en Asie Mineure de M. Philippe Le Bas," a book now, in its complete form, very rare. But not only does he republish. M. Reinach intends to replace the old drawings, when inaccurate, by new ones, and, moreover, to accompany the plates with "des commentaries très sobres." In fact, we shall get a *précis* of the old articles, which were written very often in the diffuse and rambling style popular at the date of issue. Every one will have his own idea as to what works deserve republication; we would content ourselves with an entreaty to M. Reinach, if he is about

to republish the great "Monumenti," not to neglect the brief but important "Section Française," and to publish it separately, so that those who already possess the Italian "Monumenti" may supplement their series. The importance of this will be seen when we state that though the British Museum Library, the department of Classical Antiquities, and the Taylor Library at Oxford all possess the Italian "Monumenti," not one of these three libraries have a copy of the plates of the "Section Française." The English archæologist can consult this work, to which he is constantly referred, no nearer than Paris or Berlin. Further, we trust that M. Reinach will not neglect the back numbers of the invaluable "Vorlegeblätter," of which no complete copy exists in England, probably none in France, and the republication of which we fully believe the public-spirited authorities at Vienna would permit.

THE issue of the first "livraison" of the fifth volume of MM. Perrot & Chipiez's "Histoire de l'Art dans l'Antiquité," will be eagerly hailed by a wide public. More than a year had elapsed since the fourth volume was completed, and subscribers were beginning to get a little anxious. After writing the history of the Hittites, with which the fourth volume closed, it might, however, have been permitted to the most Herculean of archæologists to pause and take breath. Certainly the new issue shows no sign of failing strength. The volume is to be devoted to the history of civilisations less remote in date, *i.e.*, Phrygia, Lydia and Caria, Lycia, Persia. The section on Phrygia is likely to excite special interest in Great Britain, as it is a country which a British archæologist has made specially his own. The authors amply acknowledge their debt to the researches of Prof. Ramsay, only regretting that his able pen was not seconded by a pencil of like dexterity. Unquestionably the ideal explorer must be draughtsman and, we may add nowadays, photographer. Many scholars will share the further regret that Prof. Ramsay's discoveries are not published in separate form. At present they have to be sought for in the pages of not a few periodicals, but this, we may hope, is matter for future intention.

IN the last number of *L'Architecture*, M. Edmond Pottier contributes a letter on Antique Polychromy, combating the idea that a Greek temple was an edifice painted in every part, from the steps to the cornice, which appears to be entertained by some French archæologists. He observes that no monument, except the temple at Ægina, offers traces of colour on the shafts of the columns, and that a comparison cannot be instituted between that case and such a building as the Parthenon, inasmuch as the latter was in marble and the former in porous stone, to which it might have been thought desirable to give a surface finish of paint, or stucco painted, without implying that the same treatment would be applied to marble.

ACCORDING to a recent number of the *Berliner Philologische Wochenschrift* (1889, No. 3), the newly-discovered theatre of the Muses at Helicon bids fair to rival the splendid proportions of the Epidaurus theatre, —the largest so far discovered. Only the stage portion (σκηνή) is as yet laid bare; it is 20 mètres across, and of the thirteen pillars with which it was once faced there are traces of seven still remaining. The theatre is about five minutes' distant from the Temple of the Muses, which was discovered earlier, and, according to the *Athenæum* (Jan. 5, 1889), presents striking analogies to the Nikè Apteros temple of the Acropolis at Athens. Pausanias, in his account of Helicon (ix. 28 *seq.*), does not mention explicitly either temple or theatre, but he describes in detail the beautiful and fertile (εὔυγως) mountain itself, and the numerous statues dedicated within the precincts; he mentions also several tripods, the most ancient of which tradition said Hesiod had received for a victory with an ode. The excavations are being carried on by the French.

THE Town Council of Edinburgh have acquired sixty-one acres of the estate of Inverleith, at a cost of 33,500*l.*, for the purpose of conversion into a public park. The ground is situated to the north-west of the city, having the grounds of Fettes College to the west, and the Arboretum to the east. It has an easy slope to the south, and commands fine views of the city. On three sides it is bounded by roadways, and, when the contemplated new approaches are carried out, will be easy of access from all directions. It is proposed that a riding track should be formed, so that Edinburgh will thus have its Rotten-row. This new park will supply a desideratum which has long been felt by the "West-enders" of Edinburgh, and will form an additional attraction to that city as a place of residence.

A RECENT invention of Messrs. Randall & Carter, for the preservation of freestone from the effects of weather, was exhibited by them at the Cannon-street Hotel on the 15th inst., in the presence of a large number of architects and builders. Several specimens of well-known oolitic freestones, which had been treated by this process in such a manner as to make their surfaces quite hard enough to be polished, were shown. The process consists of treating the stone with a compound of milk of lime, acetic acid, and cane-sugar (or molasses), which, when applied, soaks into it for a depth of about ½ in., and produces a slight chemical change, materially hardening it. The stone may either be entirely immersed in this solution, or the latter may be applied to its surface with a brush. The surface is then rubbed to a face with fine grit and allowed to dry, after which it is subjected to a diffused dry heat of from 130 deg. Fahr. to 160 deg. Fahr. in an oven. When the stone to be treated is fixed in position, as in a building, it is stated that the compound may be applied with a brush, either with or without heat subsequently. Although it is admitted that by heating the stone its durability is greatly increased, we think it questionable whether this is practicable on a large scale after it is built up. But even supposing it were practicable, it is very doubtful whether the hardened surface would protect the stone for any great length of time. Experience has shown that, where only a hardened coating has been formed, moisture soaks in, either through the cracks in the masonry or through portions of the surface of the stone itself, rendered vulnerable by the defective application of the preparation, whatever it may consist of. The moisture collects behind the hard coating, and produces a line of weakness, in consequence of which the thin crust flakes off. Moreover, it is absurd to suppose that, because a lime solution hardens a stone, the latter thoroughly resists decay, as has often been suggested. The mere fact of the stone being hardened does not add much to its durability from a chemical point of view, unless the hardening material be acid-resisting. The only effect of the hardening is to render the stone less absorbent, and therefore slightly more durable, for a few years at most. Unless the protective solution soaks also into every part of the stone, saturating it entirely, it is of very little permanent use.

THE *brochure* recently issued by the London Geological Field Class, under the direction of Professor H. G. Seeley, F.R.S., very clearly shows the nature of the instruction received by its members during the field excursions of the summer of 1888. It would appear that not only is field geology taught in its purely scientific aspects, but that the uses of the various materials found in the quarries, sand-pits, and brickyards visited in the neighbourhood of London are briefly explained. This is decidedly a step in the right direction. To instil a taste for geology in the minds of the public we think it is very necessary to show the beginner the practical applications of the science, whilst this phase of the subject is more useful to the average mortal than the intricate philosophical problems presented to the more exclusive student. But exceedingly few professors of the science understand this portion of their inquiry, and still fewer lecture upon it; and the architect or engineer desiring to learn something of geology, to assist him practically in his profession, will do well to bear this in mind. Prof. Seeley, however, seems to be fully alive to the importance of the practical application of geology; and has paid every attention to it, so far as the limited number of excursions has enabled him. On the occasion of the excursion to Aylesford and Maidstone, for instance, we find in the pamphlet alluded to an excellent account of Kentish Rag, as exemplified by Preston Hill Quarry, showing its normal chemical composition, weight, method of dressing, and durability; and giving the names of some buildings where it may be seen. We notice a little slip where it is stated that nearly all the churches on the Thames are built of Kentish Rag, an observation not strictly in accordance with fact. In the reports of other excursions, explanations are given of the uses to which chalk is put for dressing clayey soils, making lime, whiting, putty, and Portland cement; whilst the uses of flint in glass-making, and clay in brick-making, &c., are also briefly alluded to. This field class is the only one of its kind, we understand, in Great Britain, and the success attending it is sufficiently encouraging to warrant the starting of other classes with the same useful object, on the same lines, in other parts of the country.

THE last number of the journal of the Architects and Engineers' "Verein" of Hanover contains a report of a paper read by one of the members on the building which, it is said, is to form the model for the mausoleum to receive the body of the late Emperor Frederick. It is a curious little building at a place called Innichen, in the Tyrol, erected in the seventeenth century, by a returned pilgrim, in imitation of the Church of the Holy Sepulchre at Jerusalem. To that church, now better known as the Dome of the Rock or Mosque of Omar, it, however, bears no resemblance, except in so far that the church proper surrounds a small building or tomb to receive a sarcophagus, and has, attached to one side of it, a second church with an enclosed octagonal chancel for the performance of the ritual of the Greek church. The plan shows a narrow vaulted aisle surrounding a nave, square at one end and having a pointed polygonal apse at the other, and covered with a dome, eliptical on plan. The tomb follows the same plan, and has a small western antechapel, and a very long, broad step for the accommodation of pilgrims. The detail of the tomb and arcades is Romanesque in character, but the rest of the building is in the style of the period in which it was built. No view or section is given in the journal, but the plan looks as if it might work out to a sufficiently solemn and dignified edifice.

IT appears that some German makers of Portland cement are still in the habit of manufacturing, and selling as "Portland cement," cement mixed with foreign substances, more especially cement in which dolomite (containing a large percentage of magnesia) has been burned to a condition of slag. This adulteration leads to the development of a tendency to swelling, which shows itself even after several years. To put a stop to this practice, the members of the "Society of German Manufacturers of Portland Cement" have published a declaration by which they bind themselves to put into the market as Portland cement only a product obtained by an intimate combination of calcareous and argillaceous substances, as chief constituents, burned to a state of slag and ground to a condition of flour. This declaration does not extend to small additions made with a view of regulating the time of setting of Portland cement, and which may be as high as 2 per cent. Any member who acts contrary to the obligation undertaken by signing the decla-

ration, will be excluded from the Society; such exclusion to be made public.

THE proposal to acquire the Craiglockhart Hills, on the outskirts of Edinburgh, as a place of public resort, meets with a good deal of support in the city, and the proposal of the managers of the lunatic asylum in that neighbourhood for the erection of additional buildings connected with the institution, on the eastern slope of the hills, is a good deal criticised. It is contended that the asylum is now practically within the city, and that it would be beneficial in every respect were the present grounds and buildings disposed of, and new ground acquired at a convenient distance upon which new and better buildings could be erected. It is alleged that this could be done without pecuniary loss, as the grounds of the asylum would fetch a large price for building purposes, and that more convenient buildings could be erected on the new site,—those at present in use not being, in every respect, what they should be.

THE old "Town Book" of Belfast, containing many historic records of interest, is to be published, edited by Mr. R. M. Young, of the firm of Young & Mackenzie, architects, of Belfast. The volume will be accompanied by illustrative notes, views, maps, and *facsimiles* of various kinds. The edition will be a limited one, issued for subscribers only.

LAST week Mr. Walter Crane delivered the prizes at the Cambridge School of Art, and made an address to the students, urging an increased direction of study towards applied art. In the course of his address, he observed "that he saw from the report that the committee thanked the Corporation for colouring the walls of the school, and he thought it would have spoken well for the school if the students had cultivated their decorative talents by colouring those walls themselves;" a practical hint on art-education which is worth noting.

THE ROMAN THERMÆ.*

BY PROFESSOR AITCHISON, A.R.A.

IT seemed to me that all we could learn from the Roman Thermæ was not exhausted in my former lectures, so I propose continuing the subject in this.

Thanks to the intelligence and industry of Palladio, we have his restored plans, elevations, and sections of the back part of Agrippa's Thermæ, and of what remained in his day of those of Nero, Titus, Trajan, Caracalla, Diocletian, and Constantine.

The little mason's lad of fourteen, whose intelligence attracted the attention of the poet Trissino, while his house was being altered (just as our Ware, the chimney-sweep, attracted the attention of his patron, who afterwards built Chesterfield House and translated Palladio), was destined to become the greatest architect born and practising in the sixteenth century; and so early did his talent for architecture develop itself, that at twenty-three his portrait was painted by Bernadino Licinio, with the square and compasses in his hand, the ring on his finger, and clad in the scarlet doublet and the open cloak trimmed with fur, with the inscription in Latin of Andrew Palladio, architect, twenty-three years old, 1541. This portrait is believed to be in Her Majesty's collection.

When we consider that he designed and saw carried out more buildings than any other Renaissance architect, without speaking of his designs for temporary theatres, triumphal arches, and machines, the illustrations he made, and the books he published, we can only be astonished at his marvellous industry in measuring, drawing out, and restoring every Roman ruin he met with, not only in Rome and Italy, but in the South of France as well.

It is to be deplored that the researches of Lord Burlington, of Cameron, Bertotti Scamozzi, Temanza, and others for the text were fruitless, for we can have little doubt that it was prepared and ready for publication with the drawings.

Palladio's industry in studying the remains of Roman antiquity was not thrown away upon himself, for the grandeur of proportion in his buildings has been the test of his works when the authorship was otherwise doubtful. Mr. Penrose, who has measured some of his works, as well as the remains of antiquity, says he is the only modern architect who ever equalled the ancients in excellence of proportion.

We owe him undying gratitude for preserving records of the grandeur and magnificence of Roman buildings. Since his day many of them have been swept from the earth, so that not even the ruins remain. Let us not, too, refuse our meed of gratitude to the illustrious Lord Burlington, who searched for, found out, and published these priceless records, for, not to speak of the chances of "time, war, flood, and fire," a few more years of neglect might have consigned these drawings to their fate, either to furnish a kite-tail or to light a fire. I must, however, say that Palladio's restorations must be looked on more as an exercise for himself than any deliberate attempt to restore them as they really were; for instance, when he has shown four equally-spaced columns on the plan in several corresponding openings, and he thought the elevation looked monotonous, he did not hesitate to turn some of them into Venetian windows, with the central space double the side ones. He also had a bad habit of not putting ticks to his dimensions, and of treating the thickness of walls as of no importance, and if he used three different measures he leaves us to find them out.

The study of comparative architecture is as useful to the architect who aims high, as the study of comparative anatomy to a physiologist, for it enables him to see how the new needs are met, while still adhering to the main formula; and also how the requisite accommodation could be got on ground of different proportions.

It exercises our ingenuity in trying to solve the riddle of the reasons for which the new forms were adopted, and offers us the means of tracing the gradual evolution of new principles of construction that were to culminate in the Byzantine style; which, again, gave rise to other styles more divergent and perhaps even more daring. It shows us how the Roman architects dealt with buildings on a grand scale, and that, too, when nothing was used in their construction but the commonest materials,—rubble and concrete. Every part was built of rubble, faced with a skin of brickwork, except where great strength was wanted at isolated points, and this was met by isolated columns of porphyry, granite, or sound marble.

This last expression may sound curiously to your ears, but one of the large French marble houses put up a notice "that all flowered and figured marble for sale is pieced, cramped, masticked, and stopped, as is the usual custom of the trade"; so if you should ever want marble columns to carry walls or vaults, and not lath and plaster, you must be careful to choose marble that can be got sound of the diameter and length wanted. M. Charles Garnier had all his marble columns at the Opera House, that were to carry weight, tested with the hydraulic press.

I will now revert to the Thermæ, and treat them chronologically, beginning with the Thermæ of Agrippa, said to be the first Thermæ that were built in Rome, *i.e.*, buildings combining gymnasia, and perhaps palæstræ, with baths.

We were bound to begin with the most perfect specimen that remained, so as to get as clear an idea as we could of the uses and collocation of the parts, just as a comparative anatomist would begin with an extinct animal, part of whose carcass was found preserved in ice, when he had nothing but the skeletons of the other members of the family. We must not forget, either, that Agrippa's Thermæ are the original type from which all the others at Rome merely differed. These have many claims on our attention. Perhaps the most interesting question in connexion with them is whether they were the first built in Rome; and, if so, where the model was got from, for we can hardly imagine that a plan so complete was developed at once, combining as it does in the centre block the Greek gymnasium and its baths, with hot and swimming baths. Vitruvius is believed to describe the gymnasium of Naples in his account of the Palæstra.

I do not think there can be a doubt that the Pantheon was originally built for the Laconicum of these Thermæ; though Professor Middleton says no hypocaust was found, and no vertical flue-pipes, and nothing but a drain from the gulley under the eye of the dome. Lazeri believes it to have been a bath, as well as the building usually called the Temple of Minerva Medica.

And we know that when it was determined to turn it into a temple, Agrippa proposed to dedicate it to Augustus; Augustus refused, and it was then dedicated to all the Gods, the statues of Augustus and Agrippa being put into the niches under the portico. On the frieze of the portico there is an inscription stating that Agrippa built it. It is not to be believed that the Pantheon was domed and the scaffold struck until after Vitruvius wrote his book, or he would have mentioned it, for though considerable vaults must have been turned for the aqueducts before Vitruvius was born, he does not say a word about centering or the devices resorted to for turning arches and vaults cheaply. Arches, however, could not have been very common in his day, one would think, because he describes them as consisting of wedges, whose joints radiate to the centre, and remarks that outer piers must be thicker to prevent them being pushed out by the thrust.

The next point to be noted is this, that the upper half, which is alone shown by Palladio in Cameron's book, seems complete. When the circular laconicum (the Pantheon) was taken from the baths, what room was used in its place? We have the two peristyles with their ephebia, the two front entrances to them, with the halls and the two side entrances, the four rooms on either side the centre of the back front, only according to Palladio there is no entrance to them but from the grounds. Taking the front, we have the tepidarium, with its four recesses for baths and its transepts, the eight piers forming strong abutments for the vault with a vast semi-circular exhedra at each end, two swimming baths, and two rooms beyond the upper exhedra of the tepidarium, the first probably the cella media, and the further the concamerata sudatio.

B. Peruzzi made a design for the Palace Pitegliano on the site of the lower half, and in this plan he shews a grand laconicum, but to what purpose the rooms around it were put we know not.

This second block looks like a separate bath, possibly for women, for, if not, there was only one circular laconicum, which is awkwardly situated for the upper baths, for it seems as if you had to pass from the tepidarium into the open air to get to it. Professor Middleton believes this lower circular laconicum was built by Septimius Severus; we know from an inscription on the architrave of the Pantheon that it was restored by Septimius Severus and Caracalla. Baron H. De Geymüller believes that B. Peruzzi, in his drawing of the ruins, which includes a line of columns in the piscina of the upper part, also indicated a circular room in the middle of the tepidarium, which Count Nispi-Landi shows. I have had it dotted on in red, but it would utterly destroy the magnificent effect of this vast hall,—164 ft. long, 68 ft. wide, and 90 ft. 10½ in. high (in this case Palladio gives the height to the crown of the vault), and would make the entrance part of the tepidarium very small,—I am inclined to say insufficient,—for, excluding the semi-circular exhedræ, which Palladio shows as separated from the tepidarium by unroofed passages, there is only one hall about 57 × 68 ft. cut off from that at the other end by the laconicum, for you will observe on the plan there is no other way of getting to the farther end except through it, the swimming-baths, or from the gymnasia.

As to the columns in the swimming-bath, we know that at Nîmes the Roman bath has columns in the water.

At Agrippa's baths, Palladio does not show the columns drawn by Peruzzi, but shows the swimming-bath open. If these aisles of the swimming-baths were vaulted on the columns, the light could not have been very good, unless, indeed, the vaults had hypæthra.

As these are, in point of time, the first, it may be well to see in what points Caracalla's differed from them. To begin with the gymnasium first, we see the entrances have a room beyond the apses of the entrance hall at one end and three halls at the other; these may have been apodyteria.

The peristyles of the gymnasium went right round, *i.e.*, had a cloister all round instead of on three sides only, as at Caracalla's; and on the other side of the gymnasium there is one long

* Continued. Being the Fourth Royal Academy Lecture on Architecture this Session, delivered to the students of the Academy on the 7th inst. For the previous lectures see *Builder*, pp. 83, 103, 121.

and one nearly square room, which we suppose were an elæothesium and a conisterium, and from it there was a portico to the swimming-baths, although they could be got at from the gymnasia and from the tepidarium. In the four back rooms, got at only from the grounds, Palladio shows three vaulted, and the one next the tepidarium open; while on either side of the cella media are two rooms or courts shown unvaulted, as well as the room called by me the cella media, though this does not stand for much, as the big oblong hall, shown without vaulting on the plan, is shown vaulted with groined vaults in the section.

The upper piece of the bath shown by Palladio is not much less than the central building of Caracalla's bath; as it is 641 ft. long, by 318 ft. deep, while Caracalla's is 716 ft. by 367 ft.

The next that Palladio gives are those of Nero. We know from Martial that these were excellent, for he says, "Who could be worse than Nero: what better than his baths"? (lib. 7, epig. 33). And they are spoken of by contemporary writers as the best, for the baths of Etruscus are only said by Statius to be equal to Nero's. Seneca's diatribes against the costly fittings of baths are supposed to apply to those of Etruscus and Nero. Though from the accession of Augustus to the death of Nero there was only about ninety-five years, changes in the fashion of bathing and in the use of the baths and gymnasia may have taken place.

Nero was a great admirer of the Greeks, and a patron of the fancy. In this case we have the swimming-bath in the centre; it is said that Nero introduced sea-water as well as the aqua solfatara, but these waters were possibly only supplied to the solia, labra, or alvei. On either side of the swimming-bath, which Palladio shows open, were the peristyles of the gymnasia, but the ephebia are semicircular exhedræ; it is said the exhedras of the philosophers were so near the games that, when people got tired of the noise of the philosophers, they could listen to the clink of the quoits. Three small chambers are on one side of the ephebia, and four on the other. Two of each were possibly elæothesia and conisteria, but whether the coryceum was still in use we know not, or whether the other rooms were small baths.

Beyond the swimming-bath we have the tepidarium, about 152 ft. long, 66 ft. wide, 93 ft. high to the centre of the vault, with the usual baths and abutments; and in front of that again three successive chambers, but no circular laconicum; and in a line with the nave of the tepidarium are two large halls, each 134 ft. long, 61 ft. wide, and 61 ft. high, with a shallow portico beyond the end of each.

Palladio shows these halls as vaulted with two bays of quadripartite vaulting, and without columns. The question is, what were they used for? I can only suggest for playing at the little ball; for the younger Pliny says in describing his Tuscan villa that his tennis-court was over the undressing room. Galen, in his treatise on the little ball, does not say where it was played. On the lower side of each of these halls is a very long, narrow, vaulted room, with a square one at each end, and another oblong room communicating beyond; they may have been undressing rooms, or they may have been for the sea and sulphur baths. I have not met with any account of a library in the Thermæ until Diocletian transferred the Ulpian library to his Thermæ.

If we had the ruins now, or even a good contemporary description, we could have had the negative evidence of not finding sunk baths or the remains of labra, and the presence or absence of pipes to suggest their use. Professor Middleton decided that the rooms, two storeys in height, in front of Caracalla's Thermæ were not baths, as no pipes to them were found.

The four rooms on either side of centre of the back front are there, but there are no oval rooms among them, and there are a set of four smaller chambers at the back of them and communicating with them; but what their use was, unless as undressing rooms, we cannot even conjecture. The four rooms can only be entered from the grounds, except that the large room at each end communicates through a small room with the shallow porticos at the ends of the halls that are prolongations of the tepidarium.

Modern restorers, Cameron and Blouet to wit, give us sketches at least of the ruins, but in this case we have nothing but the bare restorations of Palladio. The small chambers by the exhedra of the gymnasia are shown by Palladio as having no entrances. I spoke of them as elæothesia and conisteria, so if he be correct we can only imagine them to have been cisterns.

In looking at the back of these Thermæ, we see an oblong block, with a semi-circular portico in front, and each of the square lumps on either side of the portico contains two rooms and a staircase. Was this a portico for shade, or a sudatorium in lieu of the laconicum? Beyond it, towards the tepidarium, is a long, narrow room, with apses at both ends, and a way through the middle. The room was 72 ft. long and about 20 ft. wide, and beyond this is another vaulted chamber, from which you enter into the transept of the tepidarium.

The Thermæ of Titus had, I think, without doubt the swimming-bath in front. But until we know from excavations whether it extended as far as the line of the open porticos, its restoration is mere conjecture. The tepidarium is of the usual shape, 164 ft. long, 70 ft. wide, and 92 ft. high, with the ends of the transepts cut off by screens of columns. Beyond the screen at the north end is an apse abutting on the piscina, with an opening into it. Beyond the south transept is a long chamber, 34 ft. wide, with apsidal ends very like the calda lavatio, or it might even be a laconicum; and beyond this the vaulted room or portico projecting beyond the back front, like that in Nero's bath, but the only communications between the two are through two open areas, with one opening in each into the laconicum or calda lavatio, and another into the chambers to the right and left. On either side of the before-mentioned laconicum there are three rooms only, instead of the usual four, but one in each set has segmental ends, probably the sun-bath. These rooms are only to be got at from the grounds and from the laconicum. There are the two peristyles, one at each end, with vast semicircular exedræ as ephebia, as at Nero's—probably with the dust and oil stores at the sides. The only entrances Palladio shows to the gymnasia, except from the tepidarium, are through two circular chambers, about 82 feet in diameter, with descending steps all round. These circular chambers are contained in two square towers, flanking the front with four doors, one communicating with the peristyle, one with the piscina, one with an open arcade, and one with the grounds. I went there twice, but could not get in. Professor Middleton calls them laconica, but if they were laconica they are very awkwardly situated, and without knowing whether there were flue-pipes, their use cannot be positively determined. From their shape they may have been cold baths,—there is one of this shape at Pompeii,—or they might be rooms for ball-playing,—sphæristeria; but in any case, how else could the baths be entered? The most perplexing parts are the five steps down Palladio shows in these circular halls. This depth is enough for a swimming-bath, but there is absolutely no entrance into the gymnasia or bath except through water, for Palladio most carefully shows in his section the two shallow porticos at the sides of the piscina where we should look for entrances as having no doors; and if these circular chambers were the entrance, why were there steps? Apparently there are no apodyteria; the two little dark chambers between the baths of the tepidarium and the courts of the laconicum may have been oil and perfume stores. Canina only makes confusion worse confounded.

We know that Martial bathed in those of Titus, and had to trudge through the mud from the Pantheon there, when he left a wealthy patron at or after the tenth hour (four o'clock). (Lib. 3, epig. 36.)

We naturally ask why he should do so. Was it solely to be free from his patron? was it because his friends bathed at Titus's Thermæ? because it was nearer home? or because it was cheaper? Half a farthing seems very little, but we read that the cost of living at one time in North Italy was only a halfpenny a day, so that the price might have been equal to 5s. of our present money. And we know that Martial was generally short of money.

Immediately adjoining these are baths built by Trajan, according to Professor Middleton, for women only. Palladio calls them the Thermæ of Vespasian, and Cameron the Thermæ of Domitian. They greatly resemble the men's baths, and were evidently of two stories, from the large number of grand staircases. The ground-floor, which Palladio alone gives, shows them without a circular laconicum, or a grand stand, but with two gymnasia and an ephebium to each.

We know from Martial and Juvenal that some of the fair sex of those days by no means coveted the usual laudatory epitaph on a Roman matron, that "she stayed at home and spun wool." Some of the more Amazonian ladies not only went through the gymnastic exercises and fenced, but entered the arena and killed lions,—at any rate, in Nero's days. They, too, raised the ire of the Roman writers by being blue-stockings, just as the learned ladies in the days of Queen Anne enraged the poets, and were satirised by them.

"Though Artemesia talks, by fits,
Of councils, classics, fathers, wits;
Reads Malebranche, Boyle, and Locke;
Yet in some things methinks she fails:
'Twere well if she would pare her nails,
And wear a cleaner smock.
* * * * *
So have I seen, in black and white,
A prating thing, a magpie hight,
Majestically stalk;
A stately, worthless animal,
That plies the tongue, and wags the tail;
All flutter, pride, and talk."
Pope, "Artemisia."

To continue the description of these baths, there are three back rooms without the oval one, though the last room at each end has a flat apse.

These baths are almost close up to the road, according to Canina, and the only entrance from the front is into the apse of the tepidarium. On the flanks there are entrances from the back of the ephebia, and at one end an entrance from one of the halls of Nero's Golden-house into the apsidal end of the last back room. There is, however, a grand staircase to the grounds at the back from the lower street in the place of the grand stand, and you can enter the baths from the back, a passage running through the middle of the projecting building into a vestibule to the tepidarium. Whether the rooms on either side were laconica caldæ lavationes, or swimming-baths, we know not. One room might have been a laconicum, or a calda lavatio, and the other a swimming-bath, and I have ventured to show it so.

In this bath of Trajan it is well worth observing how the rooms are made to fit where they abut on Nero's Golden-house, some of the rooms of which, standing at a different angle, are entered from the grounds and halls.

It is unnecessary to go through the Thermæ of Antoninus Caracalla again, though we must not lose sight of the fact that, in point of time, these are the last but two of which we have Palladio's plans.

In the grounds of Diocletian's baths the grand-stand is a segment, though nearly semicircular, like that at the Thermæ of Titus, and now forms the entrance to the Via Nazionale from the Piazza dei Termini. We must not forget that we enter the church of Sta. Maria degli Angeli from what was the back of the Thermæ, the entrance being in the centre of the apse of the projecting back building, and, after passing through the laconicum and an arm of the transept, we come into the nave of the church in its middle.

The other arrangements of the main building closely correspond to those of Caracalla's; we have a vast swimming-bath in front. The tepidarium, though it has the transepts screened off by columns, looks, with the parts beyond, like a Mediæval cathedral, with square chancels at both ends. About the use of these ends we are absolutely in the dark. No doubt the ecclesiastical-looking plan of these baths struck Pius IV. (1559-65), when he got Michelangelo to turn them into the Carthusian church of Sta. Maria degli Angeli. Palladio does not give the length of the tepidarium, but it is, from my measurements, about 194 ft. long by 79 ft. wide to the face of the walls, and according to Palladio, 100 ft. high. The floor of the present church is said to be raised about 7 ft. above the old floor, and the nave of the church looks therefore rather squat. Sir C. Barry, when on his travels, noticed the unfortunate spoiling of the effect of the nave by one being obliged to enter it in the middle. At the back of the tepidarium is a circular laconicum, 68 ft. 9 in. in diameter, with a square recess on each side, beyond that again is the projecting covered portico, swimming-bath, or hot-room, the first of which we noticed in Nero's Thermæ. The gymnasia, with the ephebia and halls, are similar to those of Caracalla's, only the peristyle is much longer, and goes right round, instead of stopping at the ephebium.

There are the four rooms on either side of the laconicum, shown by Palladio to have no

communication with the baths, and to be entered only from the grounds; but, according to Cameron, the end ones communicate with the gymnasia. This bath is said to have accommodated 3,200 bathers. There are two large oval halls, one in front of each gymnasium, 71 ft. 6 in. wide, 110 ft. 6 in. long, the apses at each end being screened off by a colonnade of six columns. The peribolus has vast exedræ halls and palæstræ, and a nearly semicircular grand stand, 483 ft. 6 in. in diameter. In front of it stood a column 2 braccia and 18½ oncia in diameter. We can by no means positively assert where the Ulpian library was placed. As I before mentioned, a bell was found in these baths, which may have been the bath bell.

The baths of Constantine on the Quirinal have disappeared to make room for the Quirinal, the Rospigliosi, and Bentivoglio Palaces, though they must have been comparatively perfect in the sixteenth century, for Palladio gives the height to the crown of the vault of the tepidarium, and to the top of the dome of the laconicum.

The entrance to these was from the north, in the centre of a huge semicircular arcaded enclosure, which embraced the whole width of the baths. In the centre was the piscina, flanked on either side by covered porticoes, which are entered in the middle of the length by a doorway to each from another portico, with columns in front next the semicircle. Palladio shows no main entrance to the warm baths, except for swimmers, and the only other entrances are through openings on both flanks, through a series of small chambers, which resemble those at Nero's baths. Before you come to these openings, on either flank are two long chambers, also entered from the flank, about 100 ft. long and 23 ft. wide, whose length equals the width of the two covered porticoes to the swimming-bath. The nave of the tepidarium is 132 ft. long by 57 ft. wide, and 75 ft. high to the crown of the vault. Beyond the end of the tepidarium are two vaulted halls, without columns, as at Nero's baths, each with one apsidal end, and the other screened off by columns from the tepidarium. Each of these halls is 87 ft. long by 43 ft. wide, and 50 ft. high to the crown of the vault, with four chambers on the north side, entered from the hall by two openings. In Palladio's time the connexion between the tepidarium and the calidarium was gone. The calidarium is a building composed of four flat apses, and measures about 51 ft. inside each way; there is just an angle of the square left to show that it was generated on a square of about 37 ft., with apses of 6 ft. 10 in. internal depth projecting from each side; from this the circular laconicum is entered, 75 ft. in diameter, and 94 ft. high to the eye of the dome. On three of the arms of the intersecting diameters of the circle are three circular recesses with columns, projecting to the extent of a semicircle beyond the external circular wall, and marked by four columns, and there are the three chambers on either side of the laconicum, entered only from the grounds; the last one on each side communicates with a circular hall, having one entrance from the grounds and another from an open court, cut into two by the chamber joining the tepidarium to the sudatorium. In each of these courts, besides a projecting shallow portico on the north side, are three rooms, two square and one oblong, with apses at both ends.

The most notable peculiarity in these baths is the absence of the usual gymnasia, with their peristyles. From there being a large semicircular grand stand, exercises must have gone on, though, from the absence of palæstræ, all that we can now say is that they had been demolished before Palladio measured the ruins. I may say that, as we have only got Palladio's restorations, and we do not know what state the walls were in, the want of entrances shown may be owing to the walls being removed to their foundations so as to obliterate the traces of openings.

It is to be regretted that some of our modern necromancers, who hold converse with the illustrious dead in English, do not get the gymnasiarchs, bath-masters, and distinguished athletes and bathers of each epoch to give us an account of how the thermæ were used. I am sure we should get both information and witty remarks from Martial.

I have now completed the description and comparison of all the thermæ whose records have been preserved by Palladio.

On mature reflection it seemed to me better to confine myself to this subject, and to do it as completely as I could, than to make the lectures embrace all Roman buildings, including palaces, of the use of whose rooms we are equally ignorant, and which have had less influence on subsequent buildings.

For the plans of these thermæ have been fraught with evil for past generations. As the Renaissance architects admired the size and shape of the rooms, and saw that their arrangement seemed architecturally skilful and pretty to look at, without knowing their exact destination, they gave rise to exercises in what was called the academic style. Students were told to make a design for a public building, and if the rooms were only big enough, the shapes varied enough, and the walls thick enough, the building was supposed to answer equally well for any purpose. Thus the very foundation of excellence in architecture was bad, the first point in planning being to fulfil the programme given in the best way possible, so that every room may exactly fulfil its requirements, and that the whole of them may be arranged in the most convenient way for use, have the requisite strength for supporting the superstructure, and, at the same time, be formed into an organised, characteristic, and rhythmical whole. This academic method of planning destroyed, too, not only all the natural character of the building,—for the outside of a building must say something of its use, if each room is of its proper size and height, if the windows are of the right sizes and put in the right places; but it prevented any further character being given to it, for how could the architect increase the appropriate expression if he did not know to what purpose his building was to be applied, whether it was to be a palace or a prison? In going about the country we see some of the effects of this teaching: sculpture galleries and museums are lit by side windows, with the light greatly diminished by a handsome peristyle, while the principal use of the peristyle is to form a shelter for pigeons and sparrows.

Though we should not be ungrateful to the Renaissance architects, who have made us familiar with elegant or dignified proportion, beautiful ornament, and good figure sculpture, we have paid a heavy price for these gifts. By their worship of Roman remains, and by their inculcating a blind imitation of them as the sole means of arriving at excellence, they placed architecture under a worse than Egyptian bondage for more than three centuries, and we are now only just beginning to think freely again, and to believe that the Romans had not exhausted every method of construction, nor every form of beauty, and that the worship of idols, be they Greek, Roman, or Mediæval, is not, perhaps, the highest form of worship. As soon as the Romans began to think and act for themselves, they began to develop a new style, culminating in the Byzantine. The new style was hideous enough at its outset, at Diocletian's baths and at his palace at Spalatro, and beautiful enough at St. Mark's.

Thought, knowledge, and ingenuity are as inseparable from good architecture as proportion, rhythm, and character, more particularly in days of advanced civilisation when the requirements are so numerous and so varied; but as architecture is a social expression of the age, *i.e.*, of the wants and likings of the people, we can never have a real style until there is some general agreement in what they like.

The main use of lectures is to stimulate enthusiasm, to point out new methods, or old ones that have been overlooked, and to draw attention to deficiencies.

It is needless to raise enthusiasm for the construction of buildings of colossal size and great durability, as architects ask for nothing better to do; it lies not, however, with them, but with the public to have grand and magnificent buildings to hand down the memory of our age and country to remote posterity.

These ruins of the Roman thermæ still appeal to us by their size and durability,—a durability that has braved earthquakes, neglect, and wilful destruction for 1,600 years, and in some cases for nearly 2,000, and gives us no mean opinion of the capacity and skill of the architects, the organising power and integrity of the builders, the skill and care of the workmen, and of the wisdom and grandeur of the emperors, for each emperor vied with the republic or his predecessors in constructing grand and enduring monuments for the health and gratification of his subjects.

In those days architecture, if not an honoured calling, was at least a lucrative one. Martial (lib. 5, epig. 57) advises a father to make his dull son an architect, if he wants him to be rich, while now it would be more honest to advise him to give him a broom and purchase him a good crossing.

We hope that English architecture will not always be confined to buildings that are small and perishable. We cannot hope that the passion for immediate occupation and enjoyment will ever be much abated. We are too much like the Romans in character to be deterred from hurry by Fergusson's diatribe on Roman buildings: "These display far more evidence of wealth and power, than of taste or refinement, and all exhibit traces of that haste to enjoy which seems incompatible with the correct elaboration of anything that is to be truly great."

I will only ask the advanced architectural students to apply to themselves Socrates' cross-examination of the young Athenian, who complained he was not made a general; to ask themselves, if they had to prepare designs, and see that a building of the size and complexity of Caracalla's baths, with its gigantic vaults and domes, its enormous water supply, its heating, drainage, and decoration, was to be executed in six years, or answer for the delay with their heads,—whether they know themselves to be equal to the task, and not to complain of ill-fortune until they feel reasonably confident that they could carry it out.

Before leaving the thermæ for another subject, I wish you to observe that in them you have buildings treated according to the most approved modern recipe for architecture, *i.e.*, perfectly planned for their purpose, and with the outsides left to take care of themselves; and I think that most persons of cultivated taste would say the back front of Caracalla's bath was common-place, if not ugly, and particularly so if there were no painted enrichment on it. External ugliness, however, had no more terrors for the Romans than it has for the bulk of uneducated Englishmen.

I should be sorry to pay so ill a compliment to the accomplished English architects of the present day as to suppose that any of them who had such a building as this to design would not make a much more elegant exterior. I saw in *La Construction Moderne*, a photograph of the restoration of Diocletian's thermæ, by M. Paulin, a French architect, and bearing in mind the peculiar hideousness of the building, as shown in Renaissance sketches, one could not help feeling how small was the architectural skill of those days, compared to that of our brilliantly artistic neighbours, for M. Paulin has given an air of elegance to his restoration. Even the Pantheon, built at the very zenith of Roman art, is conspicuous for its external ugliness and lack of æsthetic fitness.

It is curious how some of the main interior halls of Caracalla's thermæ have the opposite quality, and are designed, not only for splendour, but have devices for heightening their interest and increasing their architectural effect, so that they not only impress us by their size and grandeur, and satisfy the eye by their proportion, but must have had a certain mystery as well. To instance only the tepidarium and the laconicum; the first not only strikes by its size and proportion, but a certain mystery is added by the rooms beyond and the apses that were screened off by columns, and by the unscreened transepts, with the fountains in the middle; besides, one of the transepts and the apses had openings into the piscina, or the furnace courts, which must have received a smaller amount of light than the clearstory windows, while the other transept must have been comparatively dark.

The magnificent laconicum, 116 ft. in diameter, is bigger than the inside dome of St. Paul's, and, as far as its lower part is concerned, the recesses must have given variety, while above, the gallery formed a pleasing feature, and the domed roof must have had an imposing effect.

When we consider how sumptuous was the whole interior of the building, resplendent as it was with beautiful marbles, glass mosaic, painting, and gilding, and adorned with the masterpieces of Greek sculpture, we can realise the impression these thermæ must have made on the barbarians who overran Rome. The glories, too, of all these baths could hardly have departed at once, so that the later barbarians and semi-barbarians must have taken away vivid impressions of Roman magnificence. This magnificence they doubtless tried to reproduce in their own countries. That this may not appear far-fetched, I may tell you that the "oriel window," that very modest enlivenment

Incised Design in Bronze on an Etruscan Cista in the British Museum.

to the blank fronts of secular Mediæval buildings, got its name from the golden parlour copied from Rome, the window being merely a convenient recess. So much for the effect of these baths on the barbarians; but their effect on the Roman masses must have been twofold. The very fact of such colossal and gorgeous buildings being devoted to their use, and to that of the strangers staying there, must have impressed each bather with the power, importance, and wisdom of the State. Those who reflected must have thought what must such a State be that can afford such buildings merely for the health and diversion of the inhabitants of its capital. This splendour and magnificence must also have tended to foster that love of richness and colour that was such a distinguishing characteristic of the Romans, as shown in those articles of daily use that have come down to us.

There is in England a grumble that our Board Schools are allowed to have any architectural design bestowed on their outsides, and there is certainly none in the inside. The distinguishing characteristic of English manufacturers *was* the excellence of their materials and workmanship, and their want of beauty. Where can this love for beauty be better fostered than in the school? Friezes of coloured tiles, some ornamented with foliage and some with histories, and some good carving out of reach, let us say in the roofs and ceilings, and a general tastefulness and agreeableness of colour should, in my opinion, pervade them, if we want our ornamental manufactures either to rival or eclipse those of our tasteful neighbours, the French.

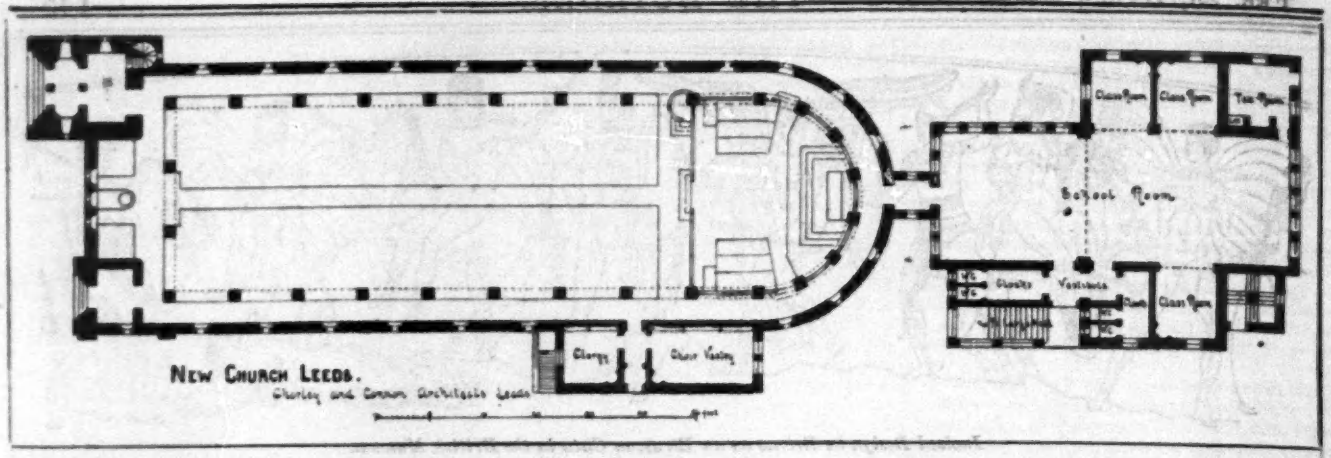
That the interiors of our public buildings are not made beautiful in colour, and adorned with historic painting and sculpture, is a reproach to our country. To show how the best judges are sometimes mistaken in their estimate of the love of the multitude for some fine work of art, I tell you this story from Pliny (N. H., lib. 34, cap. 19):—Tiberius greatly admired the celebrated athlete strigilling himself, by Lysippus, and thought it was not much cared for by the people, and had this statue removed to his bedchamber, having substituted another for it at the baths. The people, however, were so resolutely opposed to this, that at the theatre they clamorously demanded the Apoxyomenos to be replaced; and the prince, notwithstanding his attachment to it, was obliged to restore it, and, according to all accounts, he was not a very amiable prince.

ANCIENT SCULPTURE IN BRONZE:

INCISED DESIGNS.

MR. A. S. MURRAY, Keeper of the Greek and Roman Antiquities in the British Museum, delivered the first of three lectures on "Ancient Sculpture in Bronze" to the students of the Royal Academy on Monday evening last, Sir Frederic Leighton in the chair.

Mr. Murray said that in choosing for the subject of his first lecture the art of incising designs in bronze, he had been actuated principally by the desire of calling attention to one of the most recent acquisitions of the British Museum, which was a circular mirror-case, having on the outside a design in relief, to which relief he would return in a future lecture. This mirror-case was found at Corinth, and, apart from the quality of the drawing of the group which formed the subject of the incised design on the inside, it was notable for its great rarity. Though we read much of the ancient Corinthian mirrors, we found very few of them in our museums,—few, at least, having incised designs, and fewer still having drawing such as the one to which he was referring. Another inducement to him to take up this subject of incised designs lay in the fact that the British Museum possessed several other comparatively recent acquisitions of the kind, which were but imperfectly known. He referred particularly to a second mirror and to two bronze cistæ, which, though perhaps familiar to some visitors to the Museum, had not before now been made accessible elsewhere. The cistæ, like most others of the same class, were found at Præneste, the modern Palestrina. The second mirror was Etruscan, from near Perugia. It happened, moreover, that the bulk of incised designs that had survived from antiquity consisted of mirrors and cistæ, so that the specimens referred to were fairly representative, as well as new and unfamiliar. They were representative also of the two centres where most of the incised designs were found, viz., Corinth and Etruria. There was, however, one respect in which these specimens were not representative. One example from Corinth to three from Etruria was not near the true proportion: one to fifty would be nearer. The Corinthian mirrors or mirror-cases that existed could be counted on the fingers, almost; while the number of Etruscan mirrors so decorated was probably well on for a thousand. In Gerhard's work on Etruscan mirrors there were 429 plates, many of which contained two or more mirrors, and that number had been largely increased by the supplement to that work which was now being issued by the German Archæological Institute. That book was a mine of mythology and legend, with curious instances of old Roman and Etruscan beliefs. It might have been expected that the proportion would be just the other way as between Corinth and Etruria,—Corinth with its ancient fame for bronze mirrors, no less than for beautiful faces to be seen in them: Etruria famed neither for mirrors nor feminine beauty. Yet the explanation was not difficult to find. We read in Strabo (c. 381) of how, when Corinth had been destroyed by the Romans under Lucius Mummius, the ancient tombs were ransacked systematically for the pottery, bronzes, and other objects which they were known to contain. So active was that industry that a special word was coined to describe the spoils thus obtained; they were called "*necro-Corinthia*." It was easy to imagine that in those days many incised mirrors found their way to Rome, only to disappear for ever, while others might have been sold to rich Etruscan ladies, to be ultimately buried with them, and perhaps recovered again in our time to swell the number of so-called Etruscan mirrors. Indeed, among the latter there were not a few examples which looked as if they were of pure Greek workmanship, whether obtained in the way referred to or imported fresh from the makers of them in Corinth. Up to now we had no proof that the art of incising designs on bronze was practised at Corinth previous to the fourth century B.C. The existing specimens were of that date,—in some cases perhaps even later. The question, therefore, arose whether that art came into existence at Corinth in the fourth century B.C.? Or, at all events, did it at that date start into a new and beautiful life, and if so, what were the circumstances which led to such an awakening? It should be remembered that Corinth in the fourth century B.C. stood high as a school of painting. To all appearance it had come suddenly into fame through the genius and ability of a few men. The characteristic of the school was its excellence in drawing, for which it attracted no less a person than Apelles. The mirror from Corinth was just such a work as would be produced in circumstances where artistic attention was attracted chiefly to excellence in drawing. The subject was a nymph seated on a bench beside a fountain. Pan had come to meet her. The scene illustrated admirably the spirit of the Bucolic poetry of Greece,—that poetry which sprang into existence and popular favour just about the times of Apelles. The existence of the fountain was indicated by the presence of a swan, and by the pebbles with which the nymph and Pan were playing. The figure of Eros or Cupid beside the nymph was a reminder that the time in which the artist of this bronze lived was a time when symbols and personifications occupied much of men's minds. The conclusion which the lecturer had arrived at after studying this bronze was that its excellence of drawing indicated that it was a product of the fourth century B.C., and that probably the art of incising designs on bronze mirrors was introduced in Corinth then, and not till then, in which case the comparatively few specimens yet found might be taken as an average of those that might have been obtained had Corinth not been sacked by the Romans. The lecturer then went on to show that from the end of the seventh century, all through the sixth century, and through part of the fifth century B.C., an active intercourse in matters of art was carried on between Greece and Etruria. It could not be doubted that the extensive importation of painted vases, first from Corinth, then from Athens, had acted on the artistic taste of the Etruscans. On those vases there was an overwhelming abundance of Greek myth and legend from which to choose subjects. On one class of vases which the Etruscans seemed to have liked,—the circular kylikes,—they would find the idea of a design disposed within a circular space, while on archaic specimens they would observe a free use of incised lines; so that from those elements lying to their hand, it was not perhaps a very startling piece of originality to take a plain circular mirror of bronze and transfer to it the circular design on a Greek painted kylix. That explanation would, he thought, account for the fact that a certain proportion of the Etruscan mirrors had designs of an archaic character going back to about 500 B.C., or even earlier,—at which time, as far as we could see, there were no incised mirrors in Greece. As an average sample of Etruscan work, the lecturer pointed to the drawing of an incised mirror recently acquired by the British Museum. It illustrated the story of Perseus, and how he cut off the head of the Gorgon Medusa. Coming to the two cistæ, the lecturer explained that a cista was a cylindrical bronze box, round the outside of which designs were frequently incised. It was a singular circumstance that bronze cistæ with incised designs had, with very few exceptions, been found only at Præneste (Palestrina),—a fact which had occasioned much conjecture. At one time these cistæ were thought to have been used in mystic rites. The phrase "*cista mystica*" became current, and even Gerhard adopted it, though recognising from the contents of the cistæ that they must have been used for the bath and for toilet purposes. The number of cistæ now known was nearly eighty. Of these only a small proportion were enriched with designs of any consequence. The most famous, and still the most beautiful, was the one at Rome in the Collegio Romano, known as the "Ficoroni cista," from the name of the dealer in antiquities who



first became possessed of it. Apart from its excellent drawing and composition, that cista had an attraction in the inscription on the lid, which recorded that it was made in Rome by one Novios Plautios. The form of the inscription ("*Novios Plautios me fecid*") made it clear that the artist lived towards the end of the third century B.C. In no other instance had we the name of an artist on a cista. Præneste, it should be remarked, was not an Etruscan town. It was one of the oldest towns of Latium, and was situated about twenty miles to the south-east of Rome. Rome was, so to speak, its market town, and to Rome probably the citizens sent for the cistæ which they had left in their tombs. The designs on them were probably such as were popular in Rome at the time, and, if popular in Rome, popular also in Etruria and the rest of Italy, so far as Italy had been subjugated by Rome,—because after that subjugation Roman influence in art spread everywhere. As a rule, Roman influence in art was but a passion for Greek art, and the transplanting of Greek art into Italy. Referring to the incised work of two cistæ in the British Museum, of which drawings to an enlarged scale were exhibited, the lecturer said he did not put them forward as good specimens of art, or as the best of their class, but merely to show, by new examples, what that Græco-Roman tendency produced on an average. Whether at Præneste, in Etruria, or elsewhere, the result was always much the same as we saw it on these two cistæ. The first of these [which forms the subject of the accompanying illustration] combines two separate scenes. In the one scene, towards the left, is a group of two combatants, with a winged figure intervening. We had here the scene in the Iliad (III., 355 fol.) where Paris and Menelaus encounter each other. On the left was Paris, recognisable by his Phrygian cap; on the right Menelaus. Between them intervened the goddess Aphrodite, who, according to the story, rendered Paris invisible to his foe by enveloping him in a mist. In another place in the Iliad (V., 290 fol.) there was an encounter between Æneas and Diomedes, which in some respects answered to the other scene depicted on this cista. Here also Aphrodite interfered to save from spoliation her Trojan friend, Æneas, but with the result that the Greek hero, Diomedes, rushed at her and wounded her, causing the divine blood to flow. With regard to the figure of the goddess in the first subject, the lecturer pointed out that the Greeks did not give Aphrodite wings, however invisible they might believe her to be, nor did they think of her as armed with a sword. To the Etruscan artists, however, wings were naturally associated with deities. For some reason the Oriental instinct for winged invisible beings had a powerful hold on them, and in that respect the group on the cista was thoroughly Etruscan. He was, of course, speaking of a time when the Etruscans had ceased to exist as a nation,—when they had become part of the Roman Empire, and had in artistic matters plunged into the stream of the late Greek art which then flooded Italy. The lecturer, in conclusion, described the other incised cista, which, he thought, had for its subject a sort of burlesque or travesty of "The Judgment of Paris."

Architectural Partnership.—Mr. J. T. Wimperis informs us that he has, from the 14th inst., taken into partnership Mr. Wm. Arber, who has been with him for twenty-four years. The style and title of the new firm will be "J. T. Wimperis & Arber."

Illustrations.

DESIGN FOR A SCREEN IN WROUGHT AND CHISELLED IRON.

THIS design, which was exhibited in the Royal Academy in 1886, is by Mr. J. J. Shaw, and was intended as a suggestion that something more might be done with wrought-iron, in the way of surface-modelling and chiselling, than is generally attempted, and that the capabilities of the material are not entirely exhausted in twists and scrolls.

We entirely agree with Mr. Shaw's opinion, which we think he has very ably illustrated.

OLD FLORENCE:

PORTIONS THREATENED WITH DEMOLITION.

We give four views of some of the buildings of Old Florence which are threatened with demolition, under circumstances referred to at greater length in our second article.

EXAMPLES OF GERMAN TOWERS.

The drawings showing the centre tower and subsidiary towers of Mayence Cathedral, and the towers at Frankfort and Heilbronn, which form two of the illustration pages of this number, are reproduced from a work lately published, and still, we believe, in the course of issue in "Parts," by Herr C. Sutter, architect, of Mayence. The book appears under the title, "Thurmbuch,"* and is a collective illustration of towers on somewhat the same line as the English work known as "Wickes's Towers and Spires." Only two parts of the work are before us, which deal with German examples entirely, including a considerable number of the smaller, but often highly picturesque towers, such as "gate-towers," &c., which are so frequently met with in North German architecture especially. We understand it is the author's intention to include English examples in the progress of the work.

The publication fills a gap in German architectural illustration, and contains a good many curious and not very well-known specimens of tower building, which will be of interest to English architects. Those which we have reproduced we have selected as being among the best examples of the illustrations, the author having suggested to us the publication of reproductions of one or two of the plates in the *Builder*, as an illustration of the contents of the work.

The "Thurmbuch," of which each part contains twenty plates, has been, we believe, a success in Germany; and though German and English notions of architectural drawing differ a good deal, the book is worth attention in this country, for the reasons we have already mentioned.

CHURCH AND SCHOOLS, ROUNDHAY-ROAD, LEEDS.

These buildings are about to be erected to supply church accommodation in a district which has become densely populated during the past few years. They are designed in a somewhat eclectic style, without any close following of ecclesiastical precedent. The plan is an attempt to meet more fully than usual the requirements of congregation and ritual. All the seats are within the nave, and the ambulatory, which runs completely round the interior, lends itself well to processional services. The connexion formed between church and schools also enables the clergy and choir to assemble in the latter on occasions when the attendance may be greater than could be accommodated in the vestries. The organ chamber is exceptionally spacious, measuring 35 ft. by 19 ft., and proportionately lofty. The entrances are arranged carefully so as to exclude draughts, and to be ample for the ready exit of the congregation. The materials employed are simple, and comparatively inexpensive. The whole of the walls inside and out are to be of red and buff bricks, the woodwork of pitch-pine, and the roof covered with tiles. The architects are Messrs. Chorley & Connon.

CHAPEL AND SCHOOLS, LEEDS.

These buildings are erected on the south side of the river, in a crowded manufacturing district. The site being limited, and surrounded on all sides by thoroughfares, did not permit of the buildings being relieved by projections, so effect has had to be gained mainly by the outline of the sky-line. The fronts are of Horsforth stone, the internal dressings being of a finer-grained material from Morley. The architects are Messrs. Chorley & Connon, of Leeds. The original of the view given is hung in this year's Academy.

City and Guilds of London Institute.—A course of "Twelve Lectures on Architecture, dealing with the practical side, illustrated by sketches, diagrams, and specimens of materials," is announced to be delivered by Mr. Banister Fletcher, F.R.I.B.A., at the Central Institution, South Kensington, on Monday evenings, commencing at 7.15. The dates and subjects are as follow:—March 4.—Architecture (Introductory Lecture). March 11.—Foundations. March 18.—Limes, Cements, and Concrete. March 25.—Brickwork. April 1.—Masonry. April 8.—Building Stones. May 13. — Fireproof Construction. May 20.—Timber, its several Forms and Uses. May 27. — Carpentry (Roof and other Constructions). June 3.—Iron and its Use in Building. June 10.—Plastering and Materials. June 17.—Plumbing and Sanitation. To test the knowledge acquired by those attending the lectures, there will be a written and oral examination at the end of the course. To those who obtain a "pass," certificates will be granted. The Worshipful the Carpenters' Company and the lecturer offer prizes. Further particulars may be had of the hon. secretaries.

The Registration of Plumbers in Ireland.—Following the successful meeting lately held in Dublin, and referred to in our last number, an important meeting was held at Belfast, under the presidency of the Mayor. A district council for the examination and registration of plumbers, in accordance with the scheme so successfully set on foot in England by the Worshipful Company of Plumbers, was elected. Amongst those taking part in the meeting were Mr. W. R. E. Coles (Clerk to the Company); Mr. Wm. Gray, M.R.I.A.; Mr. Robert Watt; Mr. J. C. Bretland, C.E., City Surveyor; and Mr. Calwell, C.E.

Greek Mouldings Illustration Fund.—Mr. Penrose has received for this fund the following additional subscriptions:—

Dr. Radford (Sidmouth)	£1	1	0
Collected by Ernest Runtz, Esq.:—			
Mr. William Reddall	£1	1	0
Mr. Mark King	1	1	0
Mr. Henry Stock	1	1	0
Mr. Arthur Ashbridge	1	1	0
Messrs. Colls & Sons	1	1	0

This brings up the total as yet contributed to 25 guineas.

* Thurmbuch aller Stile und Länder, gesammelt und gezeichnet von Conrad Sutter; mit einem Vorwort von Dr. F. Schneider. Berlin: Ernst Wasmuth; 1888.

THE BUILDER FEBRUARY 23, 1889.

The Phototype Co., 328, Strand, London.

DESIGN FOR LARGE SCREEN IN WROUGHT AND CHISELLED IRON: SUBJECT, "PEACE."

By Mr. JOHN J. SHAW.

The Phototype Co., 36, Strand, London.

DESIGN FOR LARGE SCREEN IN WROUGHT AND CHISELLED IRON: SUBJECT, "PEACE."

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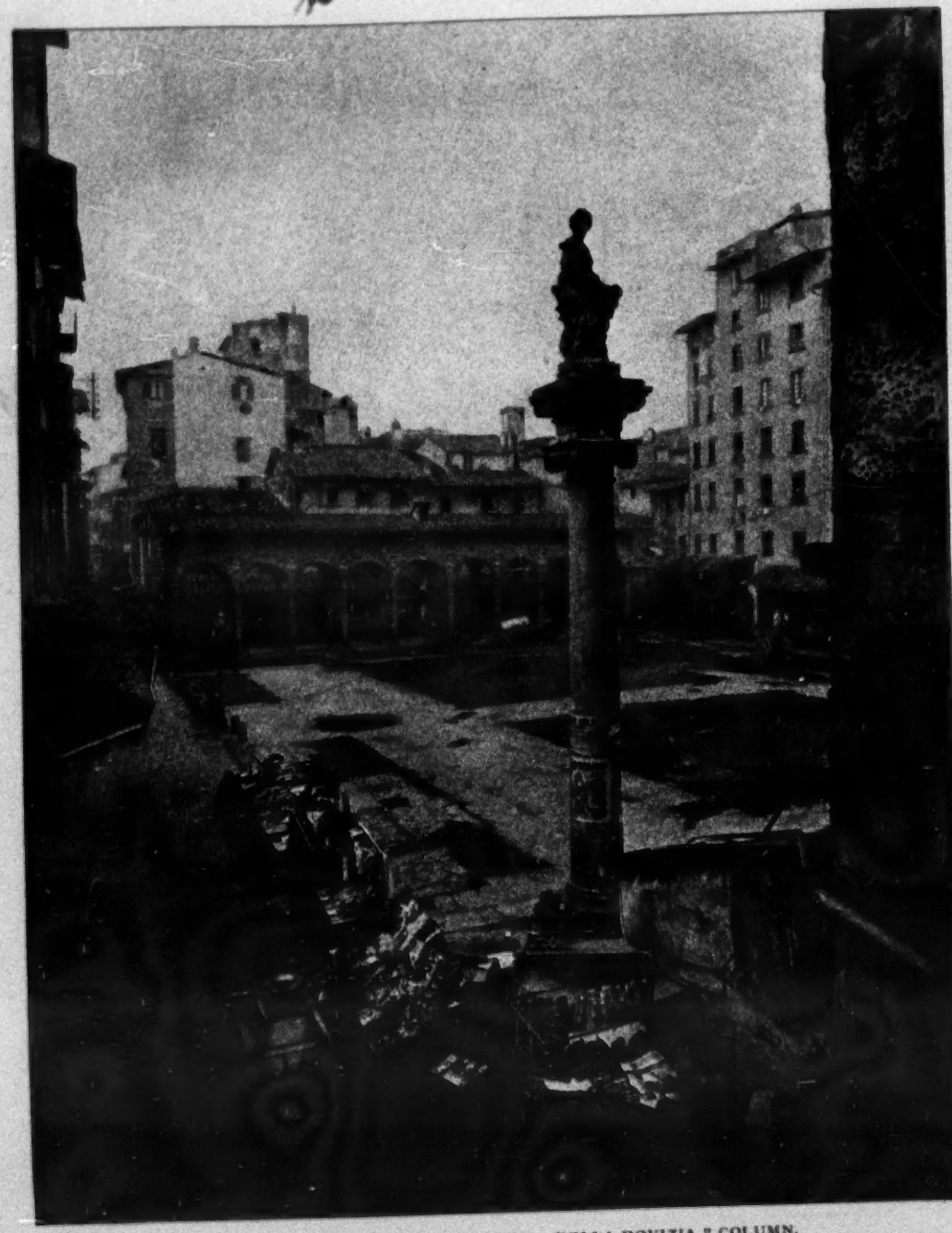
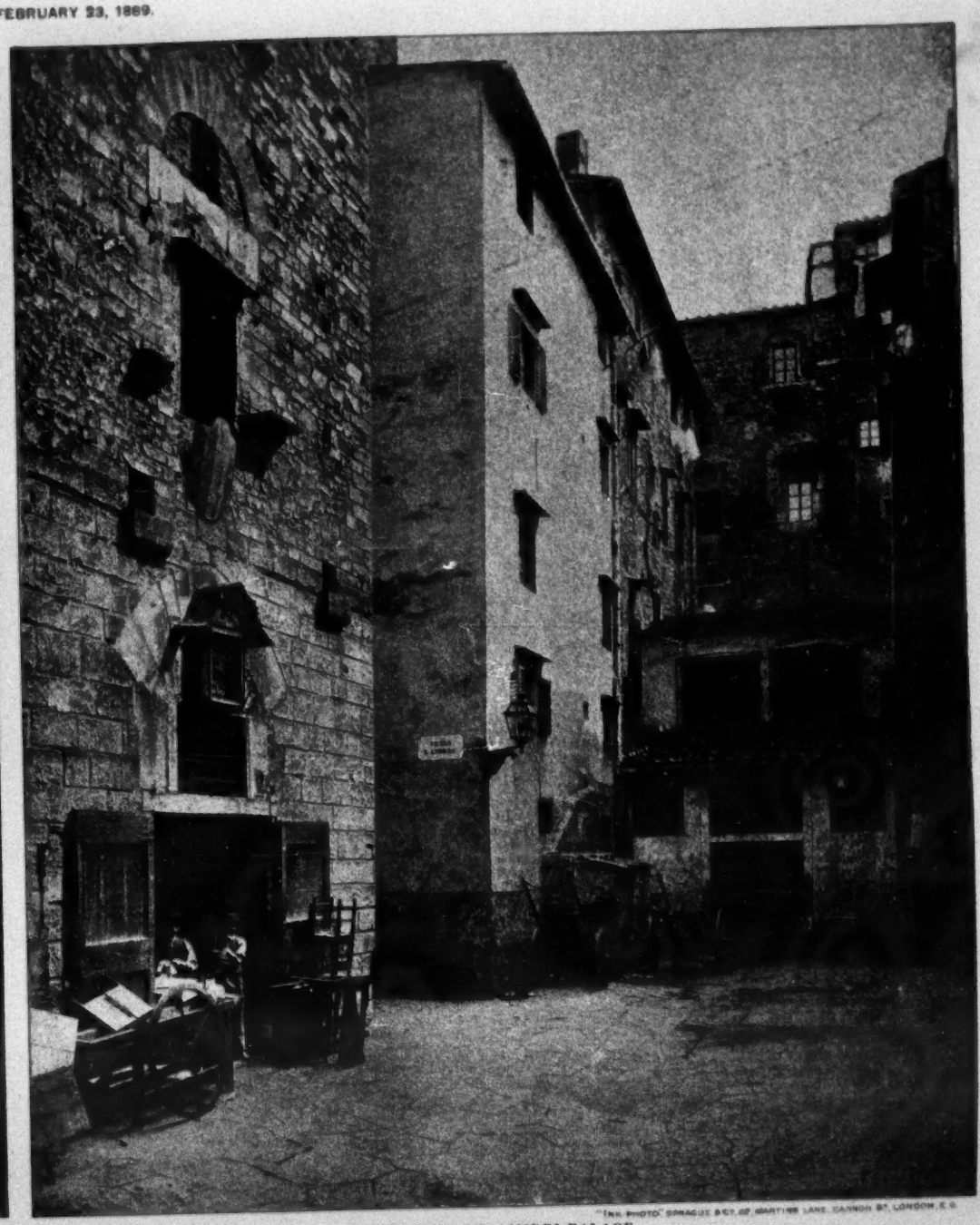


THE MERCATO VECCHIO, WITH THE "DELLA DOVIZIA" COLUMN.



PART OF THE AMIERI PALACE.

PORTIONS OF OLD FLORENCE, THREATENED WITH DEMOLITION.

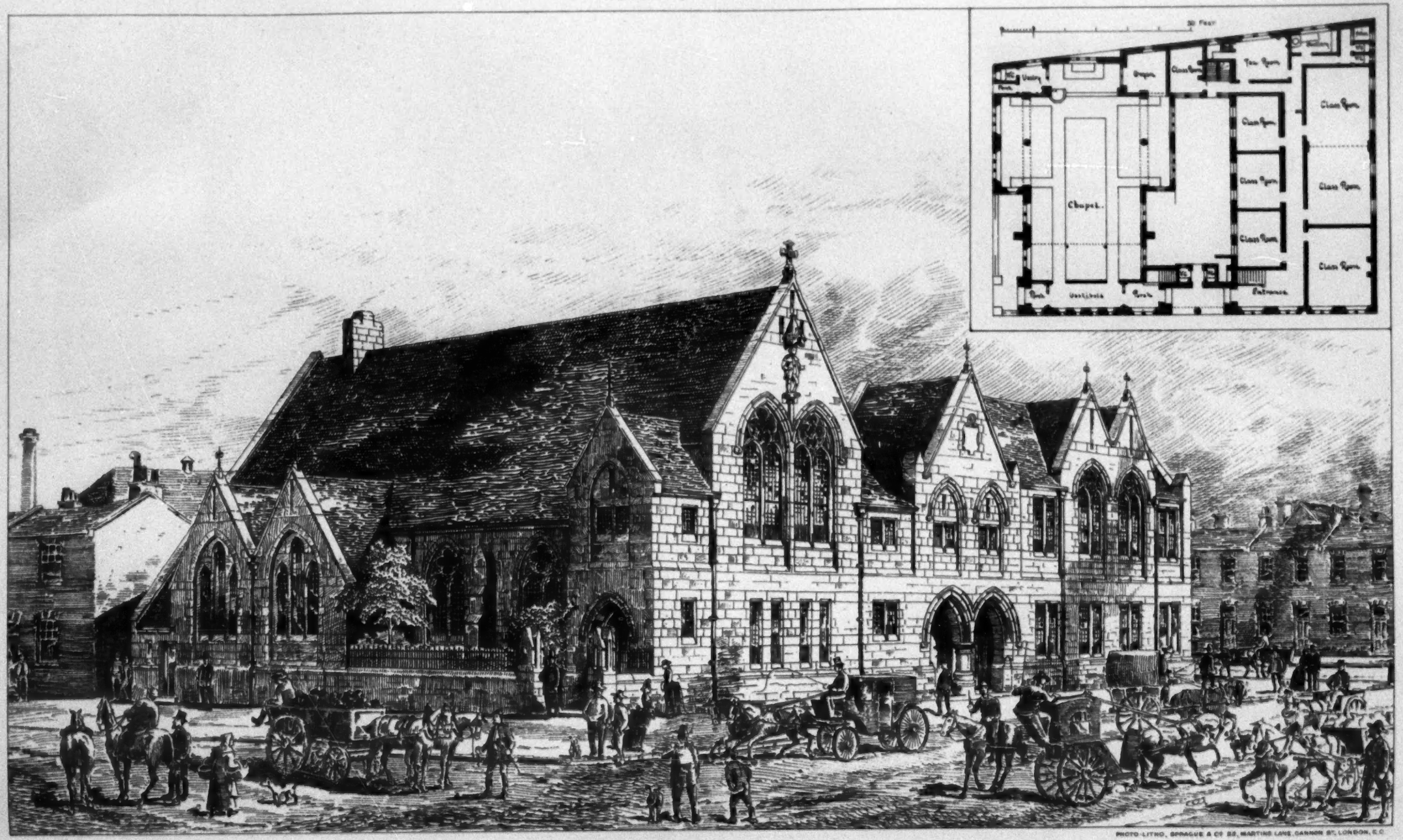
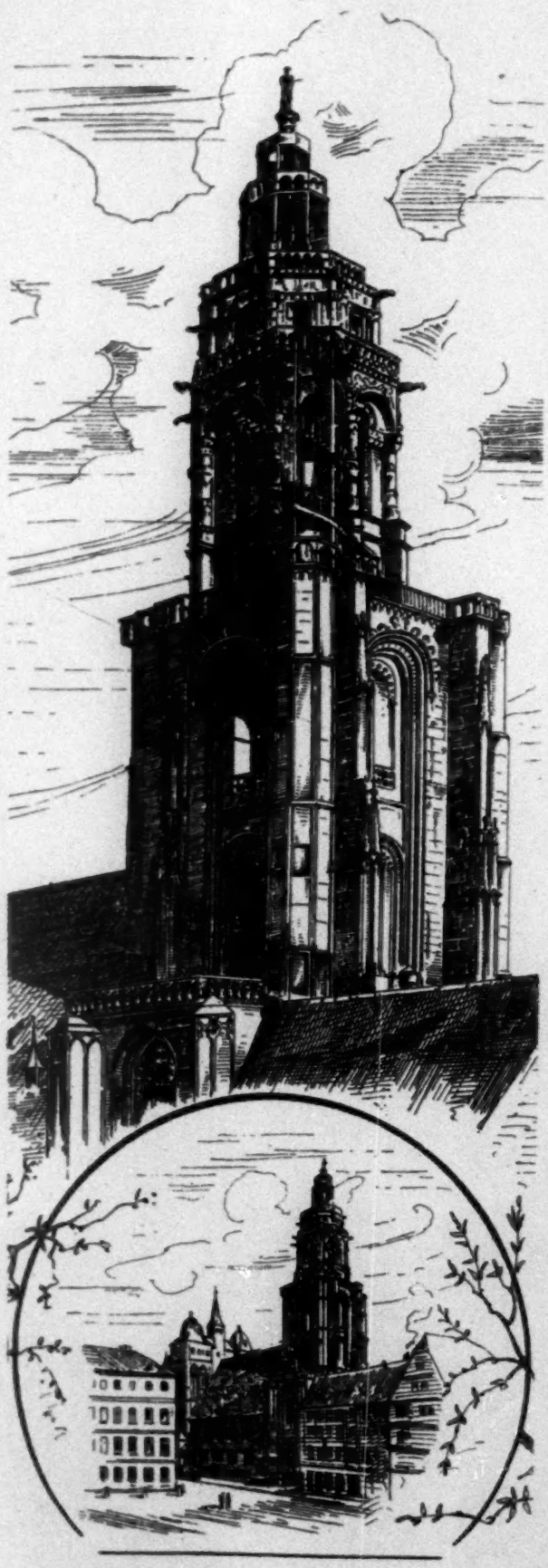


PHOTO-LITHO. SPRAGUE & Co 82, MARTINS LANE, CANNON ST, LONDON, E.C.

CHAPEL AND SCHOOLS, LEEDS.—Messrs. Chorley & Connon, Architects.

THE KILIANSKIRCHE, HEILBRONN.



CATHEDRAL, FRANKFORT-ON-THE-MAINE.

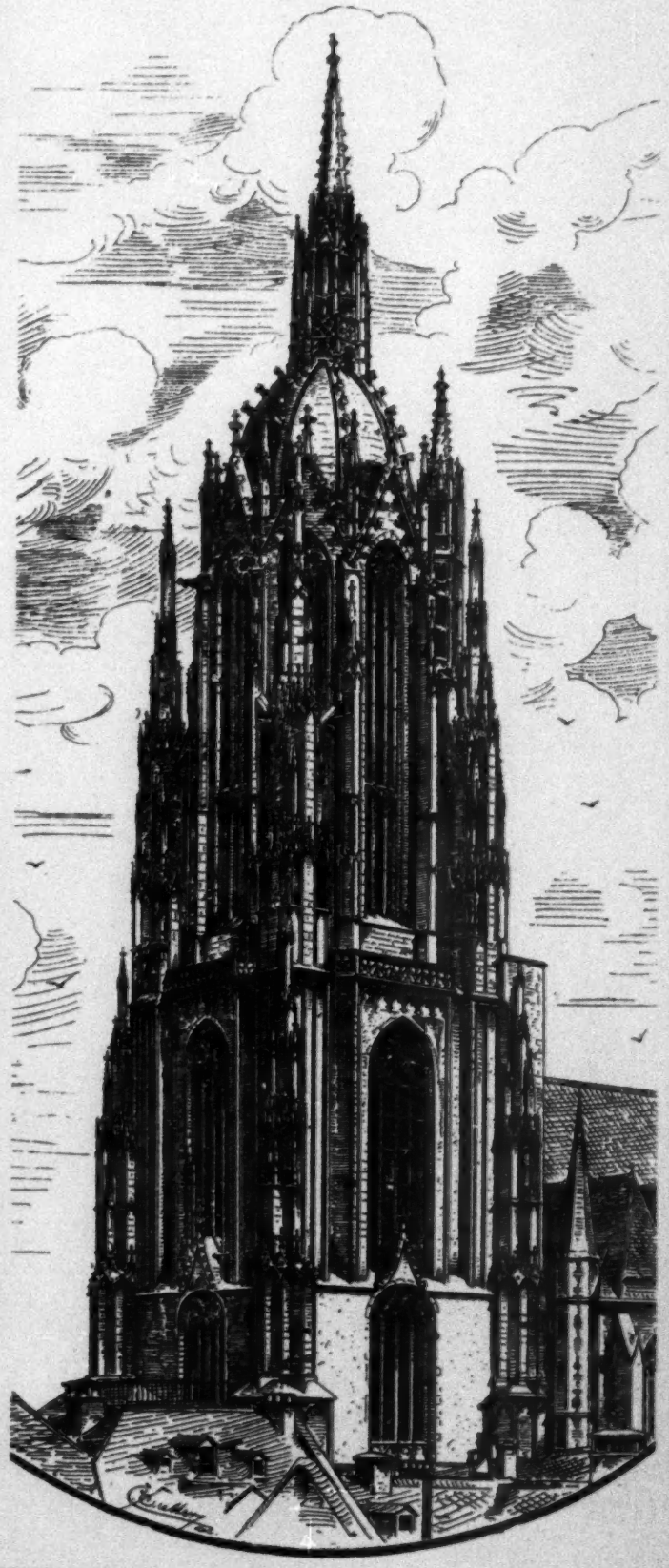


PHOTO-LITHO. SPRAGUE & Co 52 MARTINS LANE CANNON ST. LONDON, E.C.

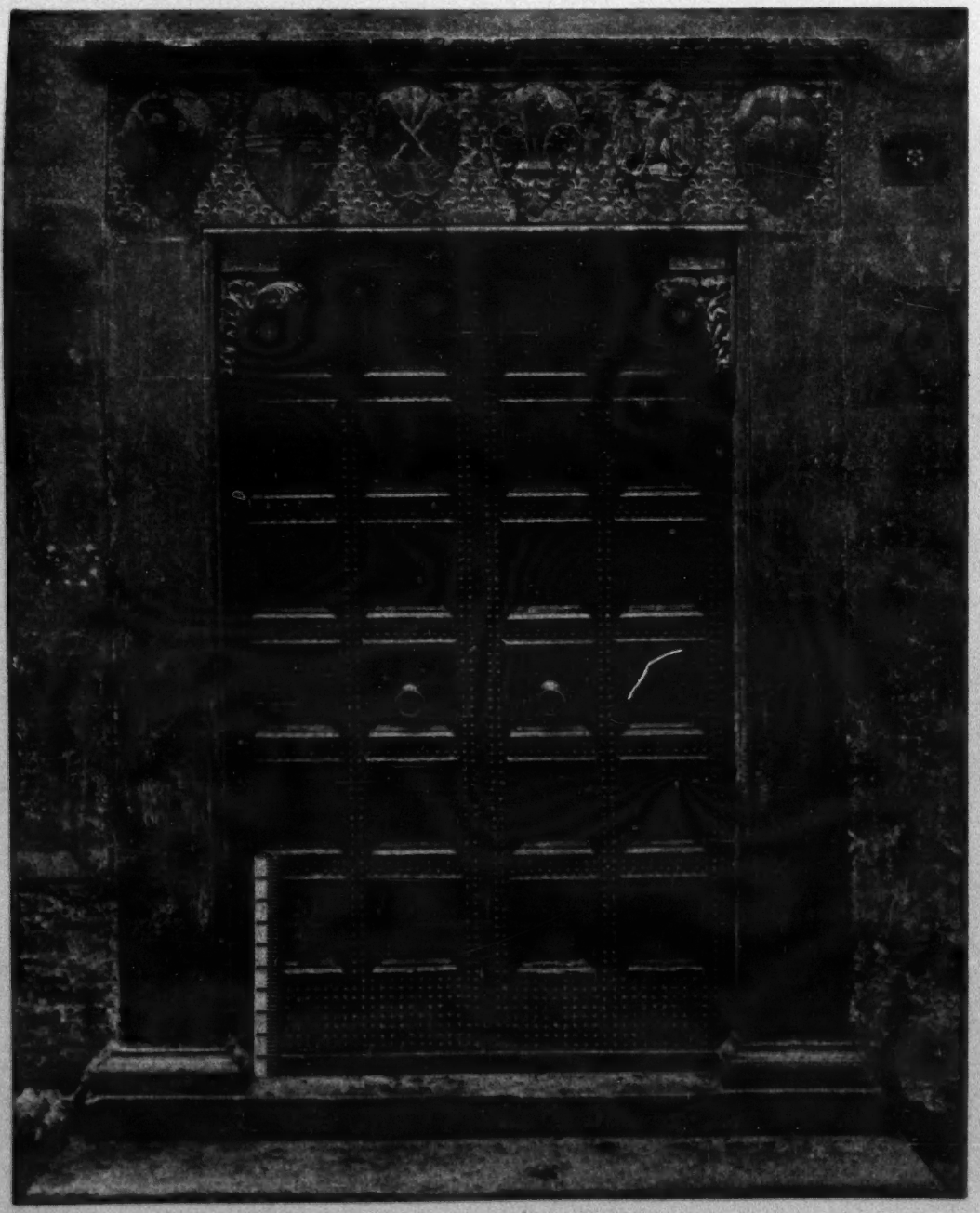
EXAMPLES OF GERMAN TOWERS.—From Drawings by Herr C. Sutter.

PHOTO-LITHO., SPRAGUE & Co' 93, MARYLAND LANE CASSON ST. LONDON, E.C.

THE CATHEDRAL, MAYENCE.—From a Drawing by Herr C. Sutter.

PHOTO-LITHO. SPRAGUE & CO 62, MARTINS LANE, CANNON ST, LONDON, E.C

CHURCH, ROUNDHAY ROAD, LEEDS.—Messrs. Chorley & Connon, Architects.



DOOR FROM THE HOUSE OF THE "ARTE DEI RIGATTIERI."

LOGGIA DEL PESCE (GIORGIO VASARI, ARCHITECT).

PORTIONS OF OLD FLORENCE, THREATENED WITH DEMOLITION.

THE ENGLISH RENAISSANCE.*

IN a recent article in the *Builder*, reviewing Müntz's great work on the "History of Renaissance Art," it was observed,—

"The charm and fascination of that extraordinary period in the intellectual history of mankind known as 'The Renaissance' have tempted one student after another to try to get at the heart of its mystery, to learn all about its art and literature, and to endeavour to realise how the men of that time really thought and felt, and what was the origin and meaning of that effervescence of artistic enthusiasm and inventive power which subordinated every other consideration to the one aim of producing beautiful work, whether in painting, sculpture, or decorative art."

Now, without attempting anything in the nature of a history of the English Renaissance this evening, I shall be quite content if I succeed in bringing under your notice a few of its leading characteristics as a style, and a few of the more prominent works of its architects, in the hope that the study may prove of some mutual benefit, and in some measure recompense you for coming here this evening. It seems to me also that the present time is not inopportune for such a purpose, if one may judge from the apparent drift of architectural thought towards a truer appreciation of English art as we find it during the seventeenth and eighteenth centuries.

In England, as elsewhere, the spirit of the Renaissance seems to have been that of a reaction against the asceticism of the Middle Ages,—an awakening, if I may so call it, of the liberty of thought and speech and action from the thraldom of Mediævalism and all its works,—a glorification of the culture and intellect of humanity as opposed to sacerdotalism of any and of every kind.

The causes that directly led to the results we shall have to consider I can only briefly refer to. Yea, are they not all duly set forth in the book of the Prophet Fergusson, D.C.L.! And, therefore, as our time is limited, I may just mention in passing those primarily concerned, namely, the revival of Classical literature, the Reformation, the advancement of general education by the development of the printing-press, the more settled state of the Governments of Europe, and the consequently greater facilities for travel. Then, again, local causes influenced the movement with varying force in the different centres of civilisation: in Italy, the birthplace of the Renaissance, and notably in Rome, the existence of the remains of the great works of the Classic ages; in England, the spirit of independence and enterprise which in after-years was destined to raise her to a foremost place among the nations of the world, and which had already in the sixteenth century enabled her to resist successfully all attempts at foreign domination by popes or kings, and laid the foundations of that national freedom which ever since has been her proudest boast.

I have just said that Italy was the birthplace of the Renaissance, and as we may have to consider the influence of her works on the corresponding movement in England, let me in a few words give you an outline of what had been done there previous to the revival in our country. Its immediate impetus was the revival of Classical literature about the middle of the fifteenth century. Fergusson tells us that—

"It was not till the age immediately preceding the fall of Constantinople that the existence of the great literature of Greece became known in Western Europe, but when Petrarch and Boccaccio first became acquainted with its beauties, they naturally lauded their discovery to the skies. Once it became the fashion, and men had got over the unfamiliar names and allusions, it was hailed with all the enthusiasm of a new discovery, and became the literature of the day. Neither in poetry nor in prose, in science nor in literature, had the Dark Ages produced anything that could for one moment stand comparison with the glorious productions of Greek and Roman civilisation."

Again, Gothic in Italy, though it had produced some wonderful works, was always more or less of an exotic; its true home was among the Teutonic races of the north and west. The Renaissance to the Italians was in the main but a return to the traditions of their national art. It is little wonder, then, that the transition from the study of Classic literature to Classic architecture was but short and easy. The hour had come, and, following with the swiftness of cause and effect, came also the men. The cathedral church of Florence, begun at the end of the thirteenth century, had its great octagon still uncovered at the beginning of the fifteenth. Its architect, Arnolpho da Lapo, died leaving little, if any, information as to what he intended to do with it, so that when Filippo Brunelleschi was commissioned to finish it, he had no original design to guide him. Under the circumstances, and the influence of the dawning Renaissance, he hurried off to Rome and made an earnest study of the famous dome of the Pantheon, that wonderful fane described by Byron as

> Simple, austere, sublime.
> Shrine of all saints, and temple of all Gods
> From Jove to Jesus—spared and blest by time.

Returning, he built the Florentine dome as we now see it. This was between 1420 and his death in 1444. During this period also he built the Church of Santo Spirito at Florence, a Classic church on Mediæval lines, with a small dome at the crossing. Following Brunelleschi came Battista Alberti, with the Church of St. Andrea at Mantua,—a notable example, with coffered waggon vaults over the nave, transepts, and choir, springing from pilasters and cornice of the Corinthian order, and with a complete dome at the crossing, carried by four great arches, the type of all the subsequent churches in the style. Alberti died in 1472, and was followed by Bramante, who built the church at Lodi, with a dome in the centre, surrounded by four equal apses, and, besides several palaces, commenced St. Peter's, at Rome, in 1506. St. Peter's, as you know, was carried on by several architects till the great Michelangelo designed the dome, and left it practically completed at his death in 1563.

Besides these typical churches, many great palaces had been built during this famous period, such as the Farnese at Rome, by San Gallo and Michelangelo; the Museum and Palace of the Conservatori, by Michelangelo; the Borghese Palace, by Lunghi, built about the year 1590, and others. Then there come the works of two men who had great influence on the English Renaissance—Vignola and Palladio—contemporaries. They fixed the proportions of the orders by scale, and reduced Classic architecture to the system which has characterised it ever since. One of Vignola's great works was the Palace of Caprarola, designed on the plan of a five-sided fort, 130 ft. each way, with a circular courtyard in the centre, 65 ft. in diameter, — perhaps the germ of Inigo Jones's intended circular court at Whitehall.

Palladio built many famous works in his native city of Vicenza and in Venice, such as the Barbarano Palace, the Chiericati Palace (now the museum and picture-gallery), and the Porti Palace, all in Vicenza; the famous Villa del Capri, which Jones took for his model when designing the Duke of Devonshire's Villa at Chiswick. Palladio also added the arcades to the Basilica at Vicenza, one of his greatest successes. His work was always elegant and well proportioned, and refined in detail,—the work of an artist and a scholar,—and, as we shall find, had probably more influence over the work of Inigo Jones than any other Italian architect. Vignola died in 1573, and Palladio in 1580. With the mention of two other famous names I must bring this brief *résumé* to a close,—they are Sansovino, the architect of the great Cornaro Palace and the well-known Library of St. Mark at Venice; and Scamozzi, who continued the work in 1584, after Sansovino's death. Scamozzi was still alive when Jones visited Venice in 1605. From this hurried sketch, you will observe that the great age of the Italian Renaissance was during the sixteenth century, and that most of its famous works were erected before the movement began in England.

As the sixteenth century was drawing to its close, architecture in this country had been passing through the period of transition known as Elizabethan; indeed, the whole country may be said to have passed through a transition,—a transition from the Mediæval Tudors to the Renaissance Stuarts. The process was slower and more tentative than in the case of Italy, for the simple reason that the English were more Gothic in their feelings; with them it was a national style, though it may be of a time and a state of society that was fast passing away. Through a period of strife and turmoil, through the crisis of an emancipated Church, through the triumph of a defeated attempt at invasion by a foreign foe, and the consolidation of her national power under a popular sovereign, almost ere the echoes of her guns against the Armada had died away, the spell of Classical literature had done its work. The close of the sixteenth century saw her ripe for a great change; the hour had come, and, as in Italy, the man came with it in the person of the English Palladio, Inigo Jones.

Inigo Jones was the son of a clothworker, and born in 1572,—the memorable year of the Massacre of St. Bartholomew. He is said to have been apprenticed to a joiner (a good experience for one destined to be an architect), and was probably working at his trade in London when the Armada was defeated in 1588. He was the contemporary of Shakespeare, who was born eight years before him, and died when Jones was forty-four years old; also of Rare Ben Jonson, and of the great Lord Chancellor Bacon. He seems to have devoted himself early to the study of architecture,—so much so, that some noble patrons were induced to send him to Italy in order to perfect himself by a study of the great works of the sixteenth century. In the beginning of 1603, Queen Elizabeth died, and was succeeded by the British Solomon, James I., afterwards one of Jones's most appreciative patrons. Shortly after the famous Gunpowder Plot, Jones paid his first visit to Italy. The brief outline I have given of the rise of the Italian Renaissance will serve to recall to your minds what he found there, and we shall presently discover to what good use he put his knowledge. In Italy he seems to have met Christian IV., King of Denmark, who invited him to Copenhagen as his architect. There he met the King's sister, wife of James I., and returned with her to England. He was appointed by James Surveyor-General of Works, and seems to have been specially employed by his eldest son, Henry, Prince of Wales. On the death of Prince Henry, in November, 1612, Jones returned to Italy, and once more devoted himself to the study of the works of the great masters. Between these two visits he probably designed and carried out the Quad at St. John's College.

On his return from this second visit to Italy he designed the new Whitehall Palace. Probably the scheme may have been talked over before he went abroad, and, if so, it is more than likely this second visit had something to do with it. Be that as it may, Jones was now in the prime of life, and a thorough master of the principles as well as the practice of his art. His design for Whitehall is so well known that I need do no more than give a general reference to it. It was proposed to occupy a site extending from St. James's Park to the river, 1,152 ft. in length by a breadth of 874 ft.,—from about the present Horse Guards to Westminster. Through the centre of this vast area ran the great court of the Palace, occupying nearly the site of the present roadway of Whitehall. On each side of this great central court were three smaller courts, the centre one on the park side being circular, 210 ft. in diameter. The only fragment of this great scheme ever carried out is the Banqueting-house, now standing on the east side of Whitehall. Jones could have seen nothing on so vast a scale in Italy, or, indeed, anything at all like it. It shows what a consummate artist he must have been, and how thoroughly he was imbued with the spirit of the Renaissance he had studied so diligently,—that he was able not only to produce such a magnificent design, but to invest it with an originality of treatment and character all his own, and lay the foundation thus early of that peculiarly English phase of the style which it never afterwards lost. It bursts upon us in all its maturity, stamped with the individualism of its nationality, the first-fruits of the English as distinct from, and in some respects superior to, even the Italian Renaissance,—the labour of no mere copyist or adapter, but the work of an accomplished artist and an original thinker. It will be seen from the Banqueting-house, which was built between the years 1619 and 1621, that he was happier in the sources of his inspiration than the hands available to carry out his designs. Though the details are, like all his work, admirably drawn, at times the execution, and notably in the carving, falls below his ideals. The workman had not yet been educated to that perfection of workmanship to be found under Wren and Grinling Gibbons; but in spite of this, and that it is but a fragment, it remains one of the most impressive works of the style in England. Speaking of the Whitehall Palace as a whole, Mr. Fergusson says "that it was not so much in dimensions as in beauty of design that this proposal surpassed other European palaces. The only building to compare with its internal courts is that of the Louvre, but that is less in height and dimen-

* By Mr. J. M. Brydon, F.R.I.B.A., being a Paper read by him before the Architectural Association on the 15th inst., as elsewhere mentioned.

sions, and has not the simple grandeur which characterises this design; it wants, too, the variety which is produced by the different heights of the parts, and the richness of effect produced by the change of the design in the various blocks. Externally Whitehall would have surpassed the Louvre, Versailles, and all other palaces by the happy manner in which the angles are accentuated, by the boldness of the centre masses in each façade, and by the play of light and shade, and the variety of sky-line which is obtained without ever interfering with the simplicity of the design or the harmony of the whole." In 1620 Inigo Jones was appointed Commissioner for the repair of old St. Paul's. He proceeded to remodel the west front in the Classical style, but nothing was done till 1633.

In the interval his patron, King James, had died, in 1625, and was succeeded by his son, Charles I. James, like Solomon of old, was a great builder, or would have been had he only had enough money. The projected Palace of Whitehall was quite in accordance with his character. He was generous to profusion, he had a great notion of kingly dignity, but was not always so fortunate in keeping it up. In his later years, what with the failure of the Spanish marriage project for his son Charles, which is said to have lost him two millions, and wars of one kind and another, his exchequer became sadly reduced. Charles had not been long on the throne when the struggle began between him and Parliament which ended only with his life. Money was one of the main causes of dispute, so that, under the many adverse circumstances, it is hardly to be wondered that the Commissioner for the repair of St. Paul's found himself unable to make any substantial progress till something like thirteen years after his appointment. In 1633, however, as I have said, the work was actually begun. That great High Churchman, Laud, then Bishop of London, laid the first stone. Probably he was the prime mover in urging on the so-called repairs. This was the beginning of the famous west portico, which was destroyed in the Great Fire. It was a magnificent structure, 200 ft. long, 50 ft. deep, and 47 ft. high,—dimensions worthy of the Romans. It was of the Corinthian order, had eight columns and two square pillars of extremely good proportion and detail in front, and three columns in the depth. As it had a flat roof, there was no need for a pediment, so it finished with a simple balustrade,—a stately and dignified composition. Of course, it had no sympathy whatever with the old Gothic cathedral, and I am bound to say that with the exception of the portico, Jones's west front was a very poor, weak-minded affair indeed. But all the same, I don't suppose the anomaly troubled the heads of the Dean and Chapter, or their architect either. It is interesting to note that the well-known church on the Grand Canal at Venice, Santa Maria della Salute, is contemporary with Jones's work at St. Paul's, having been begun in 1632. The difference in character and feeling between these works is very striking and very instructive. It shows how distinct were the phases of the Italian and English Renaissance even at this early period,—a distinction to become more and more marked as time went on. It would be an interesting speculation, had we time to enter on it, to consider, had this famous portico been preserved from the fire, what its influence would have been on Wren's design for the new cathedral. It would have given the key-note to the order to be employed, and necessarily have dominated the scale of the exterior. I wonder also what Jones would have made of an entirely new cathedral, had it been his fate instead of Wren's to re-build St. Paul's!

I may just mention, before leaving the subject, that the front of old St. Paul's extended much further west than the present building, and that the site of this portico would be somewhere about the place where the statue of Queen Anne now stands.

Jones seems,—as far as the permanency of his work goes,—to have been equally unfortunate in another commission he had at this time, namely, the garden front he designed for old Somerset House. It was taken down when Sir Wm. Chambers began the present building,—the Strand front of which is said to be more or less a copy of it.

Jones's hands seem about this time to have been full of work. In London he designed Covent Garden Church (St. Paul's) and the Market-square, the well-known Water-gate to old York House, Ashburnham House, with its beautiful staircase,* one of the most charming interiors in England. He laid out the square of Lincoln's-inn-fields, and built some houses on the west side of it, which are still standing. He built also the Queen's House at Greenwich, and the Duke of Devonshire's Villa at Chiswick. The design of the latter is founded on Palladio's Villa del Capra, about a mile from Vicenza, but treated with a character and originality all its own,—another marked example of the distinctness of the English from the Italian phase of the style, to my thinking altogether in favour of the former. This villa has since been enlarged, but not improved, artistically speaking. In the country, among other mansions, he designed Coleshill, in Berkshire, and Wilton House, in Wiltshire, both notable examples of his taste and skill. Nothing could be happier than his treatment of these and other similar façades. He discarded the everlasting orders, and designed his details with a vigour and a freedom from the so-called trammels of Classic which we would do well to profit by. His whole handling of the style is characterised by a picturesqueness and a nobility rarely equalled by his successors, and quite refreshing after the monotony of latter-day ebullitions. He was a master of proportion, and none knew better than he did the value of fenestration, the balancing of voids and solids, and the grouping of masses generally. Internally, his rooms showed his genius for proportion and his powers as an artist even more than his exteriors; combining apartments of all sizes, as every one has to do in an English house, he always managed to make each gain rather than lose by contrast with its surroundings. He got over the difficulty of heights by coves and coffered ceilings, sometimes even making the cove of a room a third of its total height, and leaving it perfectly plain between a panelled wall and ceiling, with the skill and touch of a true artist; while corridors, halls, and staircases came from his hand as things of beauty and a joy for ever. Witness the little staircase in Ashburnham House, than which nothing more refined, more stately, and yet more like an English gentleman's house has ever been designed. In a word, he not only founded the English Renaissance, but created its national character, leaving it to us as a precious heritage, to keep and to guard, and, above all things, to study and maintain, that we, through his labour being rich, may bring forth fruits worthy of the high ideal he has set so nobly before us, and never let anything pass from our hands to which, could he but see it, he would blush to put his name.

The troubles which had probably delayed his work at St. Paul's thickened around his king as the years advanced. It is not my province to touch on that struggle, which, amid Parliaments and plots, courts and camps, petitions of rights and impeachments of bishops, storm of battle and the intrigues of traitors, moved slowly but surely to the inevitable end. Jones was a Catholic and a Royalist; for this he was compelled to share the misfortunes of his sovereign. At last, on a fatal winter morning, when the snows of seventy-seven winters had passed over his head, there came forth from the central window of the Banqueting-house he had designed in the enthusiasm of his return from sunny Italy, never thinking to what sad destiny it was foredoomed, a little procession to the banquet of death; and, in a few minutes, the passing of Charles Stuart from, as he said, "a corruptible to an incorruptible crown," invested the Palace of Whitehall with an historic interest its architect could never have dreamt of. Jones himself did not long survive the master to whose pleasures, in his happier days, the genius of the artist had so often lent additional attractions; for at Somerset House, at the good old age of eighty years, this wonderful designer of pageants and palaces, of masques and markets, of temples and villas, this bright morning star of the English Renaissance, entered into the rest he had so nobly earned.

During the years of the Commonwealth, architecture may be said to have been simply a blank, though Carter and Webb, pupils of Jones, carried on the tradition in a tentative fashion. Webb was Jones's nephew, and married his only daughter. He seems also to have been heir to his practice, as we find him carrying out Amesbury House, in Wiltshire, and the east side of the court of Greenwich Hospital, both of which are said to have been from Jones's designs, but this is more than doubtful.

If things architectural were in doleful state during the Protectorate, it was not long after the Restoration till they were woke up in tremendous fashion by the Great Fire in 1666. Something like 400 streets, 13,000 houses, numerous churches, and old St. Paul's Cathedral, were reduced to ashes in three days and nights. Most of the houses were built of wood; it was a dry season, a strong east wind was blowing at the time, with the result that by the time the fire was subdued London of the Middle Ages had practically ceased to exist. The English Renaissance had indeed received its baptism of fire, and its second greatest architect the most splendid opportunity that fortune could bestow.

Sir Christopher Wren,—a gentleman by birth, a scholar by education, and an architect and astronomer by profession,—had already designed the Sheldonian Theatre,—a most successful work,—at Oxford, and had been engaged in various projects for the restoration of old St. Paul's, when the Fire settled the question for good and all. Wren had gone abroad to study, and was in Paris at the time. From there he hurried home to take his place as the foremost architect of his time and one of the greatest figures in the history of English Art. With the grasp of a statesman and the skill of an engineer, his first work was a plan for the rebuilding of the city; to our everlasting regret it was never carried out. Recent so-called improvements, viewed in the light of this masterly arrangement of streets and squares, sink into utter insignificance. London missed the golden opportunity of becoming one of the handsomest and most convenient cities in the world, and Wren received his first disappointment. But if he was not permitted to lay out its streets, he could at least do something for the buildings that should adorn them, and for his many monuments we have but to look around us. From this time onward till the close of the century, the number and importance of the works which he designed and carried out is simply amazing. In London, in Oxford, in Cambridge, in Eton, in Hampton Court, in Greenwich, in town and in country, he seems to have been almost ubiquitous, he went everywhere, he did everything. In capacity for work and facility of accomplishment, he was an English Michelangelo. Like his great prototype, his life was as long as it was busy. At thirty years of age we find him on a Commission for the repair of old St. Paul's; forty-eight years afterwards the last stone of the lantern over the dome of the new cathedral was laid by his son in his presence. Time would fail me to attempt even a brief *résumé* of the many works which go to make up his marvellous record. If not at all times a mighty artist, such as Jones, his constructive powers were equalled only by the fertility of his invention; and it will never cease to be a matter for congratulation that a man of his genius should have been available at such a crisis in the history of our profession.*

* To be continued.

* See *Builder* for Jan. 14, 1882, for a drawing by Mr. H. W. Brewer of the staircase; and for March 14, 1885, for details of the same, and plans of the house, from drawings by Mr. Harry Birr.

FREE LECTURES TO ARTISANS AT CARPENTERS' HALL:

PROFESSOR KENNEDY ON "THE STRENGTH OF IRON AND STEEL."

The second of the present series of free lectures on subjects connected with building,† under the auspices of the Carpenters' Company, was delivered on Wednesday, the 3rd inst., by Professor A. B. W. Kennedy, F.R.S., M.Inst.C.E., the subject being "The Strength of Iron and Steel." Mr. H. C. Saunders, Q.C., presided, and there was a large attendance, notwithstanding the inclemency of the weather.

Professor Kennedy said the subject presented, among other difficulties, the primary one that it was so tremendously large. First of all, in speaking of the strength of iron and steel, one naturally thought of its tensional resistance. There were many other points of view, however, which were quite as important, but all he could do was to point out some of the more striking and important of these. Roughly, what did one mean in the first instance by speaking of the strength of a piece of iron? Apart from the questions of the effect of time and vibration, they might say its strength

† The first lecture of this course, by Professor Roger Smith, on "'Chapters from the History of Carpentry and Joinery,'" has been printed *in extenso* in the *Builder*. (See pp. 109, 127, *ante*.)

was measured by its resistance to being visibly distorted or deformed, which was practically what was commonly called its elastic strength; or they might mean its resistance to being broken, which was usually termed its ultimate or breaking strength. In order to show what happened to a piece of iron or steel when it was strained by simple tension, he asked the audience to exercise their imaginations, and to suppose that he had a bar of cast iron, 1 in. square and 40 ft. long, suspended from the roof. A piece of cast iron became $\frac{1}{6000}$ part of its length longer for every ton per square inch of weight put upon it. If he put two tons on it, the bar would come down about the sixth of an inch, and when he got to four tons, it would lengthen about double as much. When he got six tons, it would be extended about half an inch, and if he went on loading it he would get more and more extension at a somewhat more rapid rate. At twelve tons, when it had become perhaps an inch longer, he should expect it to break, even if it were first-rate metal. He should have got an entirely different result if he had taken a piece of wrought iron. Below its elastic strength a piece of wrought iron extended just about half as much as a piece of cast iron, so that a piece of wrought iron, 40 ft. long, would extend $\frac{1}{12000}$ part of its own length for every ton per square inch. The iron would not break when it got to 12 tons. At 16 tons it might stretch 5 in., at 18 tons 7 in. or 8 in., and before the bar broke he might have got it extended to 42 ft., instead of 40 ft. That was a case where they had the ultimate strength a great deal more than the elastic strength, and although the wrought iron did not extend so much as the cast iron to begin with, it had left the cast iron hopelessly behind. If instead of having wrought iron he had had soft or mild steel, he should have had just the same thing, only on a more extended scale. A piece of good wrought-iron plate would extend perhaps 12 per cent. of its length before it broke. A piece of good soft steel would extend 20 to 25 per cent. of its length before breaking, always supposing that its length was about 10 in. He did not suppose that a bar of 40 ft. would extend to 44 ft., because it was perfectly certain there would be a flaw somewhere, which would cause its extension not to be so great. The strength of that 40 ft. long wrought-iron bar depended practically only on its area. If they halved its length it would be just as strong, so that its strength was independent of its length and independent of everything except its area. Where the material was to be compressed or crushed instead of torn asunder they came to a dreadful set of complications. Supposing they took a 40 ft. bar and loaded it at the top end, in all probability it would begin to take a big bend, and would snap, not by being crushed, but by buckling and by want of resistance to tension on the convex side. The strength of a strut did not depend upon its area or its length alone, but upon its shape and the way the ends were held as well. In what was called resistance to shear they had quite another sort of thing altogether. The resistance to shear was about four-fifths of the resistance to tension. These were three simple cases of finding the strength of materials by testing-machines, but one wanted to know how these results were to be interpreted in view of the uses to which they actually put iron and steel. Would a piece of iron that had a certain tenacity have that same resistance to tension if it were left alone for fifty years, or would it deteriorate or improve? In the case of cement, the strength increased very much with time. Nobody had any notion that iron got stronger, but there was a question whether it did not get weaker. He had sent him some little time ago for testing some pieces cut out of the suspension rods of the Conway Suspension Bridge, which was, if not the oldest, at least one of the oldest, suspension bridges in the country. He tested the iron, and found that it was as good as when put in. In the making of iron it was perhaps not possible to obliterate entirely the separation between the various pieces, although in very good iron it was nearly obliterated. During the fifty or sixty years of the existence of the bridge, the weather had found out the separations, and here and there he discovered little golden specks right in the heart of the metal, where damp had slowly got in and had begun to deteriorate the iron. The time had not been sufficient for any real harm to be done, but there were little golden discolourations in places where it had not been well painted outside, which showed clearly what might have happened. The iron itself, however, did not seem to be injured; and if, instead of iron, they had used the more homogeneous material steel, he did not think any damp could have penetrated. The evidence, therefore, was very strong, that iron did not deteriorate with age in any way whatever. A very much more vexed question, and one of much more practical importance, was, did iron deteriorate in consequence of the vibrations to which it was subjected? If it did, it was a very serious matter for all our structures, because there were very few things that were not subject to vibrations of some kind. Not long ago, an engineer in Scotland, being interested in this matter, put a little instrument, whose function it was to record earthquake vibrations, on the middle of the Tay Bridge. It consisted of a couple of very delicately-balanced pendulums, which drew little curves upon a table directly they were shaken. The result of the experiment was that when a train came on to the bridge half a mile from where the instrument was it began to move. The vibrations at first were very minute, but they got bigger and bigger until the train went past, and they continued until the train left the bridge on the other side. The same thing happened in the case of every railway-bridge each time a train passed over. There was a very deeply-seated popular belief that this vibration made the metal crystalline. He had, like many other engineers, been much interested in this matter, and a few years ago he got some of our principal locomotive superintendents and civil engineers who had possession of old, discarded axles, pieces of bridge angles and plates, and old pieces of rails, to send samples for testing. In no one instance did he find any alteration whatever that he could ascribe to this vibration. The only evidence one got was a railway accident now and then by a broken axle; but from that one must not say that the iron had become crystalline because of vibration. The appearance of a fracture merely depended upon the way in which it occurred. A fracture in an axle might often happen somewhat in this fashion: there was a flaw in the metal somewhere, and the load that came on it with the continually-repeated pushing, or pulling, or bending, strained that particular place beyond its elastic strength. That strain became gradually worse until the crack had extended considerably, and the last extension might occur 100 times as fast as all the rest. The axle eventually broke where the crack was, or at some place fixed by the position of that crack. It was pretty certain that it would break suddenly, and in that case they would get a hard-looking crystalline fracture, although the metal itself had not undergone any such change; so, at the risk of saying what was contrary to the opinions of a good many, until some evidence was adduced to show that the constitution of ordinary metal was altered by continual vibration, he could say nothing, except that he believed that no such change took place. A great many pieces of machinery, such as the piston-rod of an engine, were subjected to an enormous number of repetitions of load. He asked if the mere fact that the iron was exposed to such frequent repetitions of load,—of tension, or compression, or of both,—tended to make it break sooner than it would otherwise do? Having referred to the experiments of Fairbairn, and of the German engineer Wöhler, he said the result of these was, on the whole, encouraging. Although repetition of load would cause fracture under some circumstances, it would not cause it under others, and it was mainly a question of using their common-sense to see where they could draw the line. He thought they might say they could draw the line at the elastic strength. Any load that exceeded the elastic strength would break the material if it were applied often enough. So far as he knew, no load that was under the elastic strength would break the material, however frequently applied. He was speaking now essentially of tension. If he had to speak of alternate pulling and pushing he should have to go into more details than he had time for. No engineer, or anybody who had anything to do with construction, would ever *intentionally* strain any part of his material up to the elastic limit, therefore they might safely say that so long as a girder, or tie-rod, or piston-rod was not strained up to its elastic limit they might go on pulling or pushing as long as they liked, and no number of repetitions would injure it. But it was all very well for some one to say in an office that a certain piece of iron would not be strained beyond its elastic limit. One of our most distinguished engineers in this country—Mr. Benjamin Baker, who designed the Forth Bridge—had said to him several times that he did not believe there was a bridge in existence in which some portion might not be locally, by some accident, strained beyond its elastic limit. If there were only one or two places in a very big bridge, it was possible they would be so isolated that they would have no detrimental effect, but still they might have, and they might exist just in places where the repetition of load might find them out. But the saving clause of all that was that if the material was ductile it could not well give way in the sense of breaking without so much distortion taking place first that the injury would be found out before it became serious; at any rate, they must hope so. In the case of cast iron, a great deal of which was used in our structures, there came in a very serious difficulty. When they got a big casting delivered, apparently solid and perfectly straight, they did not know what stresses there were in the material already. They did not know how its molecules were pulling and pushing among themselves. He was asked to go the other day to see some stanchions weighing five or six tons, which had given a great amount of trouble. They had been delivered perfectly good, and on the very same night the watchman in charge was startled by a very loud explosion. One of those huge stanchions had broken in three pieces. He did not think, however, there was blame attaching to anybody there. The metal broke in consequence of the existence of what might be called "latent" stresses, due probably, mainly or altogether, to unequal cooling. It would be a great discovery when some one found out how to ascertain when there were such stresses in a casting. Until they knew that, they could not tell what the strength of a casting was.

THE ARCHITECTURAL ASSOCIATION.

THE ninth ordinary meeting of the present session of this Association was held on the 15th inst., in the meeting-room of the Royal Institute of British Architects, Mr. Herbert D. Appleton (President) in the chair.

The following new members were elected, viz, Messrs. J. Harrison, F. G. Hicks, C. Harrison, G. Drew, and F. G. Hayward.

A vote of thanks was passed to Mr. Leonard Stokes for allowing the members to visit the new houses at Palace-court; and also to Messrs. Daw, Jowett, & Co., for permitting them to inspect their flats at the same place. The next visit, it was stated, would be on Saturday, the 23rd inst., to buildings in Charing Cross-road and Shaftesbury-avenue.

The Chairman announced the gift to the library of a very interesting series of photographs taken by Mr. J. J. Cole, the architect of the Stock Exchange, and consisting chiefly of City churches taken from points of view not now accessible.

Mr. T. E. Pryce (Hon. Sec.) then read the by-laws for the affiliation of the Birmingham Association.

Mr. W. H. J. Leverton, after the by-laws had been formally moved and seconded, complained that sufficient publicity had not been given to them, and, as a protest, moved—"That the discussion of the by-laws be adjourned to this day month, and that the principal items be printed, and sent to every member."

Mr. A. O. Collard seconded the amendment, which, however, on being put to the meeting, after a good deal of discussion, was lost, and the by-laws were passed by a large majority.

Mr. J. M. Brydon next read a paper entitled, "The English Classic Revival of the Seventeenth and Eighteenth Centuries." The first half of this we print on another page.

Mr. H. L. Florence, in opening the discussion, said he was somewhat disturbed in his mind at hearing a conversation in that room before the meeting began between two of the younger members, who were looking at the drawings. One said, "It will never do to revive this style of Classic architecture now!" To which remark the other replied, "No, it would give too much trouble!" (laughter). Those gentlemen were doubtless philosophers, but they correctly represented the prevailing feeling of the age. Those who had listened to Mr. Brydon's paper, and had given their attention to the illustrations of harmony of proportion, refinement and suitability of detail, and clever combination of plan,

as in St. Stephen's, Walbrook, would understand that to arrive at any success in that style would entail a greater amount of trouble than merely following haphazard the lines of some leading architect of the day. If they inspected the drawings on the screen they would see that some sort of system and some general idea ran through them all. They were not mere repetitions of Classic or Italian work, but contained considerable national feeling. For instance, instead of the lofty proportions of the French type of window, in the English Renaissance the windows, doors, mantelpieces, &c., were of a squarer form, and the same idea was carried out in the development of the Classic afterwards. Again, the examples showed a greater broadness in proportion to their height, which gave them, to some extent, a reflex of the national character, and a certain comfortable amount of substantiality (applause).

Mr. J. J. Stevenson seconded the vote of thanks, and said he considered they were indebted to Mr. Brydon for bringing together such a remarkable collection of drawings. Whether they approved of the style or not, they must all be delighted at the opportunity of seeing so many illustrations of what were considered to be its greatest examples.

Mr. Joseph Pennell, some of whose charming sketches of the old City Halls were exposed on the screen, said that in London were to be found some of the most beautiful buildings in the world. In fact, he had no idea that such an amount of wonderful material for sketching was to be found in the Metropolis. He had made those sketches for the *Century* magazine, and went on until he got tired of the wealth of material that presented itself.

Mr. J. Douglass Mathews said that doubtless many of them had studied with interest Wren's many spires and steeples, which all differed in treatment. They had all heard of the enormous number of works attributed to Wren, but it was perfectly certain he was not to be held responsible for them all. He should be glad if Mr. Brydon could inform them who was associated with Wren in many of his works. He believed that the City Architect of the day, Jarman, was in some way concerned, as a difference in the work was to be traced. One of the smaller halls of the City,—that of the Innholders' Company,—came under his care a short time ago, and although it was attributed to Wren, and no doubt he had something to do with it, he (the speaker) was astonished at the exceedingly unscientific work, especially in the construction of the roof of the building. There were also a great many houses and other buildings erected about the same time, commonly ascribed to Wren, with which he believed that great architect had nothing to do, but which bore marks of a master hand. Wren's pupils, Hawksmoor, Vanbrugh, and others, did a good deal of work, and possibly some of it might be put down to the master. It was a pity Mr. Brydon had been compelled to leave off at the point he did, as plenty of matter had been left for another lecture. If, therefore, Mr. Brydon would be good enough to turn his attention to the works of Dance, Kent, Taylor, Soane, and others, the profession and the public would be grateful (applause).

Mr. Henry Lovegrove remarked that he recollected when the style dealt with that evening was looked upon as something very dreadful, and considered as a bastard type. They now saw a remarkable change of opinion, several of the most eminent architects of the day studying and designing their buildings on the line of the old Classic works. No one could wonder at the so-called "Queen Anne" style coming in vogue for domestic buildings, for which Gothic never was a successful style in this country.

Mr. H. W. Pratt referred to the melancholy spectacle of the stones of Burlington House colonnade lying in Battersea Park, and suggested that they should be utilised to form a handsome approach to the new palace which, no doubt, would be built, for the London County Council (laughter).

Mr. Leverton said he understood that the dome of the Radcliffe Library at Oxford was said to be the third largest in England, St. Paul's being the first. He would like to know which was the second? Mr. Brydon had condemned the two orders in the west front of St. Paul's, but did he not consider that if there had only been one order used it would have been too coarse and gigantic? A good deal of the interesting work contained in the City Halls was not easily accessible, and it would be well if the Committee of the Association arranged a series of visits to those buildings (applause). Referring to the Church of St. Mary-le-Bow, Cheapside, he believed there was some Norman work to be seen in the crypt.

Mr. A. C. Bulmer Booth said that the first church erected by Wren, after the great fire, was that of St. Nicholas Cole Abbey, in 1666, the neighbouring church of St. Mary Magdalen being finished in 1668.

Mr. Alexander Payne expressed the great pleasure with which he had listened to a paper on perhaps the most beautiful period of English architecture, described by so enthusiastic and able a lecturer. A few years ago he went to measure the stones of the Burlington House colonnade, at Battersea Park, when he found small boys with hobnailed boots running over and jumping upon them.

Mr. F. R. Farrow (Hon. Sec.) said that about seven years ago a scheme was set on foot by the vicar of Battersea for re-erecting the Burlington House colonnade in Battersea-park. He was then employed to measure the stones, and he found they were all there, as well as the wooden doors which led into the arcade (applause).

The President, in closing the discussion, stated that the stones of the colonnade had passed, with Battersea Park, into the custody of the Metropolitan Board of Works, and a few months ago that Board was in correspondence with the Office of Works as to who was to be at the expense of carting away the stones as rubbish!* Mr. Brydon, in his paper, had omitted the name of John Thorpe and the Smithsons. Another carver who had a great influence on the early Renaissance was John Chapman, who carved many mantelpieces. Some of his best work was to be seen at Lacock Abbey, though it had not been measured yet, but the owner would be happy to afford every facility for that being done. Suggestions had several times been made as to having a series of Saturday visits to the Renaissance work in London, and perhaps the Hon. Secretaries would take the subject into their consideration. He understood, with regard to Sir Christopher Wren, that he was the first architect who supplied full-sized working drawings.

The vote of thanks was then put, and carried by acclamation.

Mr. Brydon, in replying, said he was under much obligation to the gentlemen who had lent him the unique collection of drawings he was able to exhibit, and notably Mr. Pennell and Mr. Troup. Kirby Hall, he believed, was Thorpe's work, but the first stone being laid in 1570, it was a little before the time with which he had been dealing. He did not believe that Wren drew out all the details of his many works. In the case of the Cambridge Library, Wren wrote that he presumed they had good masons there, because, if not, he would be happy to supply the details "at large" (*i.e.*, full size). No doubt much of the work, and especially in the country, was done by the workmen, both the carpenter work and the full-sized details, showing that the workmen of the time were thoroughly imbued with the spirit of the work, and that they stamped the English character upon it. That seemed to him to be much better than education in schools like South Kensington, and to be the true way of making the art-workman. As the subject was such a vast one, he had been unable to mention all the names, and was obliged to confine himself to the leaders of the movement. As to Dance, the Mansion House, designed by him, was an extremely interesting piece of work. The ball-room there was a beautiful chamber, panelled entirely in wood, with Ionic pilasters, designed in a way that suggested wood, and with a charming gallery running around it. Dance also built Newgate, one of the most expressive structures in London, and having its purpose stamped upon its face (applause). As to the two orders on the west front of St. Paul's, it was not his province to say what should have been done with one order. It was for Wren to do that, and for them to talk about it (laughter). But if Wren had taken the problem thoroughly in hand, he would have made a great deal of the opportunity. With regard to the Burlington House colonnade, he understood that it was not in such a ruinous condition as was commonly supposed. It seemed that an effort had recently been made to get the Board of Works to do something with it; but the idea was voted down, and the question had to be abandoned.

* See *Builder*, March 3, 1888, p. 160.

COMPETITIONS.

The Castle Mona Hotel and Pleasure Grounds.—In this competition we are informed that the first premium has been awarded to Mr. W. H. Fletcher, of 13, Berners-street, W., and Mr. John Ladds, of 4, Chapel-street, Bedford row, W.C., joint architects.

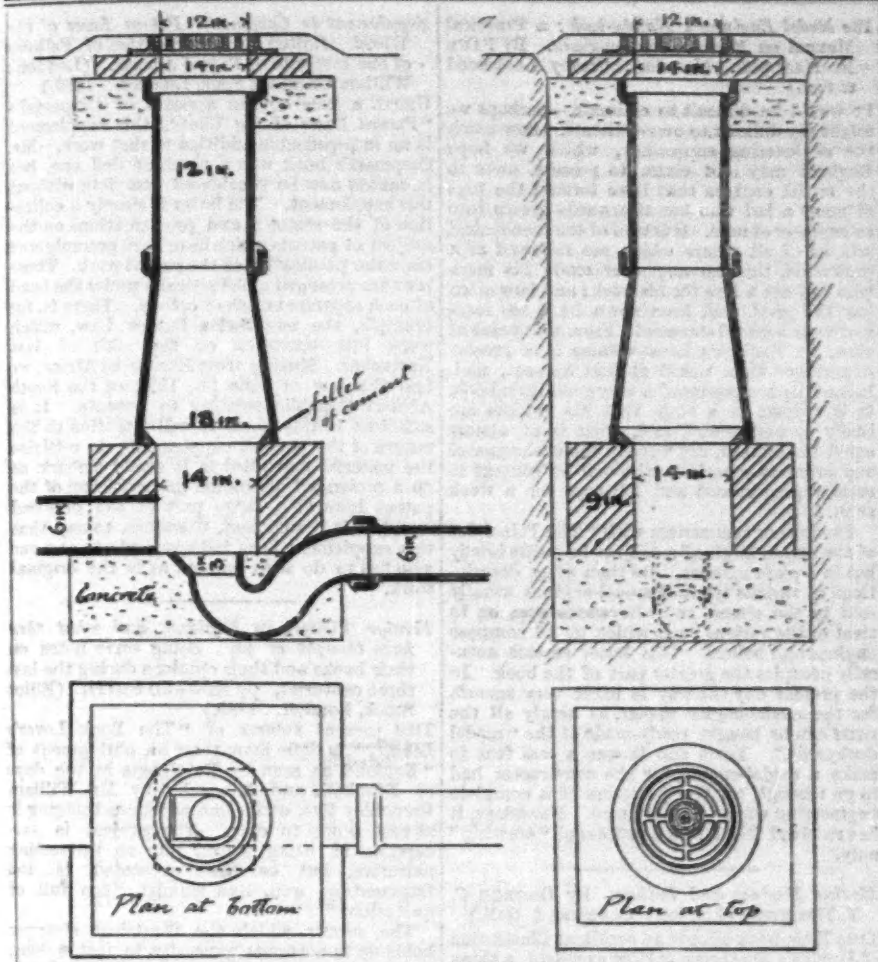
Board Schools, Bexley Heath.—The *Bexley Heath Observer* of Feb. 16, contains an account of the meeting of the Dartford School Board for awarding the premiums in the competition for the West Hill Board Schools. We gather that the four designs selected by the committee were as follows, viz.:—First premium to the design bearing the motto "School Architect," by Mr. E. Pincher, architect, West Bromwich; second premium awarded to the design "Invicta," by Mr. Horace T. Bonner, architect, London. The designs placed third and fourth were "Fitness and Economy," by Messrs. Marshall & Pictor, 7, Great Queen-street, Westminster; and "Chelmer," by Mr. F. Whitmore, Chelmsford. There were sixteen designs sent in. The report of the proceedings is amusing, as showing the way in which competitions are decided when there is no professional assessor. Efforts were made to award the first premium to a local man, whose name and the motto of his design were freely mentioned during the discussion. But the Chairman and the majority of the members of the Board were evidently intent on coming to an honest decision in the matter, and were not caught by the usual claptrap as to studying the interests of the ratepayers, which was given utterance to by those who supported the "local man's" design. The authorship of this design was stated by one member to have been revealed by the handwriting of its author upon the plans! In no other way?

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—A well-attended meeting of this Association was held on Tuesday evening last, at Queen's College, among those present being Mr. W. Doubleday (Vice-President), Messrs. W. H. Bidlake, J. W. Bradley, J. Cotton, H. H. McConnal, W. H. Kendrick, J. Ward, and H. R. Lloyd (Hon. Sec.). A paper was read by Mr. J. A. Jones, A.R.I.B.A., entitled "Five Famous Domes," and which treated of the chief historical, constructive, and artistic characteristics of the domes of the Pantheon, Rome; Sta. Sophia, Constantinople; The Duomo, Florence; St. Peter's, Rome; and St. Paul's, London. After describing the distinctive features of each dome, Mr. Jones closed his paper by a comparative criticism, in which he spoke of Sta. Sophia as having the greatest internal and St. Paul's the greatest external beauty; of the Florence dome as a masterpiece of construction; and of St. Peter's as a masterpiece of construction and architecture. The paper was followed by a hearty vote of thanks to Mr. Jones, and, after an announcement by Mr. Lloyd (Hon. Sec.) that the scheme of affiliation with the Architectural Association, London, was now fully arranged, the meeting ended.

Glasgow Architectural Society.—On Monday evening last the Architectural Section of the Glasgow Philosophical Society met in the Philosophical-rooms, Bath-street, Mr. James Thomson presiding, when a paper on "Developments in Architecture" was read by Mr. David Thomson, in the course of which he traced the various developments of the different styles of architecture, and remarked that a small but highly-gifted section of the profession were striving to graft upon the picturesque qualities of Gothic art the beauty and delicacy of Classic enrichment, and they had good reason to expect that with a still more extended knowledge of all art, and with the increasing facility in drawing and design, some new development of architectural style might gain a permanent ascendancy with the higher-educated classes, and might in time emerge in some style of a truly national character,—a style understood and appreciated by the whole people, and one in which all the arts and crafts would find a fitting expression.

The Helsingfors Exhibition, 1890.—The Finnish Government has received a number of petitions from manufacturers praying for the holding of an Industrial Exhibition at Helsingfors next year. This would be the first exhibition of this kind held in Finland.



Disconnecting Trap and Air-inlet (not in a road).

PAYMENT TO ARCHITECT BY THE CONTRACTOR.

SIR,—I have recently come across what I think to be rather a novelty in the way of conducting business between architect, client, and builder. I have been invited to tender for work, and one of the conditions states that the architect is to be paid 1*l.* 1*s.* by the builder each time a certificate is given for payment on account. These fees are not in lieu of the now too-frequent charge for copy of drawings and specification, as that charge is also provided for by another clause.

Never having experienced this condition before, I should be glad to hear whether any of your readers have met with the same peculiar arrangement in their contracts. AN INQUIRER.

*** The condition appears to us to be a most improper one. It is the architect's duty to give the builder a certificate when the stipulated amount of work has been properly done.

The Student's Column.

TOWN DRAINAGE.

VIII.—PIPE INLET NEAR A SEWER.

AN intercepting or disconnexion trap on a house drain placed near a sewer requires an air shaft or chamber on its upper side,—that is on the side nearest the house to be drained,—and this serves the purpose also of access to the trap, which we said in a former article was necessary. If the depth of the drain at the point where the trap is to be placed is not more than 5 ft. or 6 ft., and the situation is such that the top of the cover may be raised above the surface,—that is, if it is not in a roadway or footway,—a pipe of 12 in. diameter is sufficient. A smaller pipe would be sufficient were it not that a large grating is necessary for the admission of air to the drain. Those minute things with holes which one sometimes sees over drains are of no use in this situation: they allow little if any air to pass through them. The area of all the openings in the grating should exceed, considerably, the sectional area of the drain-pipe: half as much more is not sufficient: it should be nearly twice the area; and for a 6-in. drain the aggregate area of the openings in the grating should not be less than 50 sq. in. It must be considered that the air which is necessary to be supplied to the drain through these openings cannot have any great velocity: there is no force in any part of the drain to create any great movement of the air through it, and the only means of inducing a gentle current is to make the entrance easy.

In forming the inlet shaft with pipes, as shown in the figure, the cover should be raised above the surface of the ground, a few inches at least, to prevent dirt and stones falling through into the trap; it is, therefore, unsuitable for a roadway or footway. In either of these situations a dirt-box should be suspended under the grating to catch the dirt and stones which always fall through; but in a pipe there is no room for it without blocking up the airway more than is desirable. In a roadway or paved area, therefore, a brick shaft or chamber is the proper thing, whatever the depth be, and where the depth is considerable there is the additional reason for a brick shaft, that room must be given for a man to go down when it may be necessary. Also, when branch drains are joined with the main drain at this point, where the principal air inlet is formed, a brick shaft or chamber is much better than a pipe. Nevertheless, for its proper situation it is sufficient, and may be formed of two pipes, the lower one being a taper pipe, the diameters of its two ends being 18 in. and 12 in., with a straight 12-in. pipe upon it; and the taper pipe should be set upon a few courses of bricks 14 in. square inside, bedded upon concrete, in which the trap is set; and the frame of the grating may be bedded upon a single course of bricks set upon a small bed of concrete surrounding the pipe. The trap can be reached, with a proper rake, from the surface of the ground. As to the bed of concrete at the bottom of the pipe trench, there is no great weight to be carried by it, and it is chiefly of use for surrounding the trap after it has been properly fixed, with its inlet and outlet truly horizontal, and ascertained to be so either with a level or by filling it with water; after which it is kept in position by supporting it all round. For this purpose lime-concrete is sufficient. The bricks are cut where required for solid bedding over the pipe, and laid in cement, or hydraulic lime-mortar; and if this kind of lime be used for the concrete, which it is best to do, the same can be used for the mortar with two measures of clean, sharp sand to one of lime. When the taper-pipe has been set it is surrounded with the earth excavated from the trench, and rammed in thin layers, and so to the top after the second pipe has been set, if the excavated earth is at all suitable for being rammed solid, so that no further sinking can take place; otherwise the concrete should be continued to the top. The pipes may be dispensed with altogether if Portland-cement concrete be used, and a faced core 12 in. in diameter be fixed and surrounded with concrete 8 in. in thickness, or if boards be placed across the trench so as to confine the concrete to a thickness of not less than 6 in. next the opening.

Books.

A Dictionary of the Leading Technical and Trade Terms of Architectural Design and Building Construction. By the EDITOR of *The Technical Journal and Industrial Self-Instructor.* (Ward, Lock, & Co., London and New York. 1888.)

THE idea in which this technical dictionary originated is an excellent one, and if well carried out would provide a work alike useful to the architect, the builder, and the operative. To say of the present volume that it is incomplete and not quite accurate is only to say what may be said of every work that ever was published. But, apart from the impossibility of producing a faultless work on so large and varied a subject, it is possible to improve very much upon this present attempt.

In the first place, it is cumbered with many words which cannot properly be called, in the ordinary sense of the word, "technical," such as "back-door," "back-room," "billiard-room," "new work," &c., the signification of which is not sufficiently recondite to warrant their finding a place in a dictionary of this kind. Their room would be more valuable than their company. He must be a very uneducated self-instructor who had to consult a dictionary to find the meaning of "back-door."

In the second place, many words which would naturally be looked for in such a work are absent, *e.g.*, frieze, wainscot, rood-screen, &c.

Again, some of the descriptions are written without proper acquaintance with the subject. For instance, under "beam," we are told that "where it resists compression it is a collar-beam." In some cases the wording is infelicitous, as witness the following explanation of "bed-mold,"—which is described as "that part of a cornice which lies immediately below the lowest part of the cornice or the corona." Any one knowing already what a bed-mold is will see what is meant; but it is doubtful whether the novice would obtain much light therefrom; nor would the "industrial self-instructor," for whom the work is mainly designed, be very clear as to the exact meaning of the term "extrados" by this, the only explanation afforded him,—"Extrados, in architecture—pron. ex-trah-doss; Ger. äussere wölbung (äussere, outwards, wölbung, a vault),—pron. oy-serr-eh voel-boong."

In some cases the confiding student would be grievously led astray, as when, for instance, at p. 98, the Grecian orders are said to be three in number,—Doric, Ionic, and Composite; and if the periods of Gothic architecture given at p. 97, as (1) Saxon, (2) Norman, (3) Early English, (4) Perpendicular, (5) Decorated, may be ascribed to a slip of the pen, all we can say is that, in a work of this character, which is the special resource of the unlearned, such slips are very unfortunate, and should be carefully guarded against.

There is "some fine confused reading" at p. 118, where a reredos is described as something which is *sometimes* placed behind the altar, but *generally* separating the chancel from the body of the church. It is plain that the writer had no clear idea what a reredos really is, or has but little skill in exposition.

These and similar blemishes appear throughout the book; at p. 189 a "*true* roof-truss" is described as one in which "the rafters butt at their *lower* ends at the *foot* of the vertical post called the king-post;" and there are other mistakes quite as unfortunate which we have noted, but forbear to particularise, having said enough to show that the ground should be gone over again carefully before the book can be regarded as reasonably perfect.

The etymologies are generally in accord with Skeat, Chambers, and other standard authorities, and are very interesting; as are the French and German analogues; although the attempts

to give, phonetically, the pronunciation of foreign words are not more successful than usual. If the quantities of the Latin words had been indicated in the conventional way, some further help would have been afforded to those who require it; and, finally, we should like to see a few more references to the Anglo-Saxon roots for terms derived from a native source.

Still, there is very much in the book which is accurate, and will be found useful. The editor had to grapple with a large subject, and has, at any rate, furnished a basis for a useful work of reference. In its present state, however, it must be read by all, and especially by the "industrial self-instructor," with discrimination.

The Orient Line Guide; Chapters for Travellers by Sea and Land. Edited by W. J. LOFTIE, B.A., F.S.A. (London: Sampson Low, Marston, Searle, & Rivington; and Edward Stanford. 1888.)

"THE Orient Line Guide" is, in fact, a collection of essays by "eminent hands," edited by Mr. W. J Loftie, and dealing with everything of interest to the traveller to the Far East. The quality of the information may be inferred from the names of the contributors, amongst whom are Mrs. Fawcett, whose description of Naples, the cities of Italy, and the route home through Europe is one of the best sections of the book; Mr. David Hannay, who has given stirring accounts of the great naval battles in the Orient route; Mr. J. Struther, who treats in a sensible and interesting way of health at sea, showing what a sea trip can and what it cannot do for the invalid; and Mr. W. B. Richmond, who has some charming notes on journeyings in Greece. Natural history under the sea occupies the pen of the Rev. C. H. Middleton Wake, and Mr. Norman Lockyer deals with the method of reckoning the time at sea and of finding the ship's daily course. Astronomy, meteorology, navigation, and historical and statistical accounts of the Australian Colonies, Tasmania, and New Zealand all find a place in this amazing little volume, which is copiously illustrated by maps celestial and terrestrial, charts, diagrams, views of places of interest to travellers, portraits and plans of ships, and a really beautiful frontispiece from the pencil of Miss Kate Greenaway. The whole is well written, well printed, well illustrated, well indexed, and well bound, and all for the small charge of half-a-crown.

The managers of the Orient Line seek to obtain for their vessels swiftness, comfort, and safety, and boast that they have achieved all three. They have made the journey from Plymouth to King George's Sound in twenty-seven days. The interiors of their magnificent ships have been liberally and thoughtfully arranged, fitted from desings by Mr. J. J. Stevenson and adorned with pictures by Messrs. Wyllie, O'Connor, Pettie, and other artists of high reputation. The latest-built vessels are lighted by incandescent electric lamps, furnished abundantly with baths, refrigerators, and steam-worked punkahs, and out of 150,000 passengers carried across the seas in the first ten years of the company's existence, not one has lost his life by shipwreck.

We cannot spare room for a detailed discussion of the several points suggested in this book of special interest to the architect. Such subjects have necessarily been merely glanced at by the authors, a page to Gibraltar, a page to Malta, and so on. We are not of opinion that St. John's Cathedral, at Valetta, is the ugliest church in the world, or that the Maltese architecture generally is disappointing, and there are similar criticisms in the book with which we do not agree. The book might be improved in this respect. But passing from opinion to facts, Mr. Loftie states as a fact, that the Tilbury Fort Gateway, which all travellers by the Orient Line must remark, was designed by Sir Christopher Wren, and built at the orders of Samuel Pepys. We can well believe it,* but we have never found any documentary warrant for the belief. If Mr. Loftie has met with such we should be obliged by receiving particulars. The Chapel in the Fort is not as old as Queen Elizabeth, and a man of Mr. Loftie's archæological attainments should not say that it is. These are, however, small blemishes in an excellent work, and can be easily set right in that fourth edition which will probably be called for.

* See article in the *Builder* for Sept. 1, 1888, entitled "Tilbury Fort."

The Model Engineer's Handy-book; a Practical Manual on Model Steam-engines. By PAUL N. HASLUCK. (London: Cresby Lockwood & Son.)

IT would be difficult to estimate,—perhaps we might say difficult to over-estimate,—how much the engineering supremacy, which we hope England may still claim to possess, owes to the model engines that have formed the toys of many a lad who has afterwards grown into an engineer of note. It is true of the mechanical arts, as of all others which are followed as a profession, that no man ever made his mark who had not a love for his work; and how often has the good seed been sown by a toy locomotive or a model steamer! From this point of view, Mr. Hasluck's latest volume is of greater importance than would at first appear; and, indeed, he has produced a very good little book. It is written in a style that his readers are likely to understand, and, what is of almost equal importance, not beyond the exchequer of any ordinary schoolboy who will be content to eschew gingerbread and lollipops for a week or so.

The author commences with "The Principles of the Steam Engine," a subject he treats briefly but in a plain manner. He then gives descriptions of various types of model-engines usually sold in the shops, and afterwards goes on to treat of the various parts which go to compose engines and boilers. This latter section naturally occupies the greater part of the book. In the present day the way is made very smooth for the model-engine maker, as nearly all the parts can be bought ready-made at the "model dockyards." Years ago it was a real feat to make a model-engine, for the constructor had to go through all the processes of a complete engineering works in miniature. Nowadays, it has resolved itself into a process of "erecting" only.

Marine Engines and Boilers. By GEORGE C. V. HOLMES. (London: Chapman & Hall.)

THIS little book affords an excellent illustration of Huxley's apothegm, "How excellent a thing it is to know a great deal in order to say a little." Writers of the class of book to which Mr. Holmes has here devoted himself generally act on an exactly opposite principle; for this volume is in reality no more than a guide to the models in the South Kensington Museum. These models, however, form an excellent text upon which to found a history of marine engines and boilers, and as Mr. Holmes possesses the requisite knowledge of the subject, both historical and scientific, in addition to a good literary style, those who would get general information in this direction cannot do better than consult the book under notice. We have been unable to detect any statements to which we could take exception, and the only advice we will venture to offer to the author is to try and find a publisher who will issue his work with the pages cut. Every one knows what testy beings book reviewers are, and nothing is more calculated to ruffle their serenity than that return to a darker age,—an uncut volume. We are thankful to say that this detestable practice, now so fashionable amongst a certain class of publishers of more frivolous literature, has not gained a footing with those who produce scientific works. An uncut guide-book, however, seems the height of inconvenience.

Practical Perspective by a Draughtsman: Means, Course, and Operations. Fully illustrated in detail. Hammersmith: F. O. Ferguson & Co.

THIS is simply a large folded sheet of paper, with a few brief notes and instructions, and a series of small diagrams, showing the whole course of putting a small house into perspective, beginning with a plan of the drawing-board, with the block-plan of the house laid down above the space where the drawing is to be made. Even the use of the T-square and set-square in transferring points on the plan to the verticals of the view is indicated, and the various lines of construction necessary to lay down successively the ground-line of the plan in perspective, the projection of the roofs, the position and height of chimneys, bays, turrets, and gables are shown by dotted lines in successive diagrams, so that the learner seems to see the process of making the drawing going on before his eyes. The whole thing is very ingenious and practical, and could hardly fail to be useful to beginners who may not be in the way of immediate teaching and illustration by an instructor.

Supplement to Carpmael's Patent Laws of the World. Edited by a Committee of Fellows of the Institute of Patent Agents. (London: William Clowes & Sons, Limited. 1889.)

UNTIL a new edition appears of Carpmael's "Patent Laws of the World," this supplement is an indispensable addition to that work. Mr. Carpmael's book was a much-needed one, but it cannot now be considered complete without this supplement. The latter is simply a collection of the statutes and proclamations on the subject of patents which have been promulgated since the publication of the parent work. These laws are arranged alphabetically under the head of each separate nation or colony. There is, for example, the new Swiss Patent Law, which came into operation on the 15th of last November. Moving from Europe to Africa, we find the law of June 1st, 1887, of the South African Republic, relating to patents. It is sufficient in this place to call attention to the nature of the present supplement; to criticise the material embodied in it would embark us on a prolonged discussion and criticism of the patent laws of a large part of the civilised world. It is sufficient, therefore, to say that this supplement is as indispensable to any one who has to do with patents as is the original work.

Foreign Visitors in England, and what they have thought of us. Being some notes on their books and their opinions during the last three centuries. By EDWARD SMITH. (Elliot Stock, London. 1889.)

THE present volume of "The Book Lover's Library" is little more than an abridgment of "England as seen by Foreigners in the days of Elizabeth and James I.," by Mr. William Brenchley Rye, with some additions bringing it almost down to date. The subject is susceptible of being woven into an interesting narrative, but as here presented is too fragmentary, and, like Hamlet, "too full of quotations."

The mirror which the illustrious stranger holds up to nature is generally, in fact, a lens, and the distortion of our characters, appearance, habits, &c., is due to its particular sphericity,—representing us as angels of light or monsters of iniquity as the case may be.

The various estimates of us extend through a vast range, and we can take our choice. Misson in the seventeenth century found us generous, upright of heart, full of piety, charity, wisdom, and goodness itself,—better loved the more we are known Others have found us something very much the reverse of all this! Hawthorne, who lived amongst us but yesterday, could see but little in us that was admirable, set John Bull down as "a rough animal," and his female like unto him.

Many of our foibles are held up to reprobation by our critical guests,—our gluttony, drinking, love of cruel sports, &c., &c.,—and to many of the charges we can only plead guilty. It is something, however, to find the majority of our visitors agreed as to the beauty of Englishwomen. They are "the greatest beauties in the world," "as fair as alabaster," "cheerful, courteous, of a good address," "have the finest hair in the world," "are obliged to nature alone for their complexions" (oh!) "of marvellous beauty and wonderfully clever." This is a moderate sample of the praises lavished on Englishwomen, but as Mercutio says:—"'Twill serve."

The book is a chatty, scrappy little volume, which can scarcely be opened without disclosing something worth reading; but which might have been made more generally satisfactory by greater care in its arrangement.

Modern Workshop Practice as applied to Marine, Land, and Locomotive Engines, Floating Docks, Dredging Machines, Bridges, Ship Building, Cranes, &c. By JOHN G. WINTON. (London: Crosby Lockwood & Son.)

THE title of this book,—we have quoted it in full for a purpose,—is against it. The volume, a fourth edition, is one of the well-known green-covered "Weale's Rudimentary Series." It is beyond comprehension how any one can hope to say a tithe that ought to be said on the various subjects enumerated above in an octavo of 342 pages; but, as if the range was not wide enough, the publishers' preface to the new edition tells us that there have been added "practical details of gas and its manufacture, also an account of steam fire-engines, and of work done by manual and steam fire-engines, &c." We do not propose any detailed criticism of the mass of matter the author has brought together,

but in turning over the pages of the book we find that about half of them have been given up to ship-building and the marine engine. Perhaps no better index of the author's ability to deal with his subject could be found than in the fact that he refers to the Institution of Naval Architects as the "Naval Architects' Institute." Following on the passage in which this expression occurs we find it refers to "a *recent* communication" (the italics are ours) to the "Institute" made by Mr. Robert Murray. In order to ascertain the value of the word "recent" we turn to the title-page, and find the date of the issue of the book to be 1889; and further, in the publishers' preface, or advertisement, it is stated that: "A new edition of this standard book being called for, the opportunity has been taken by the author to revise it throughout, so as to embody results of recent engineering practice." Now, this "*recent* communication," in a book which is stated to "embody results of recent engineering practice," refers to that part of ancient history which treats of the Royal Mail Company's steamers *Rhone* and *Douro*,—vessels steaming 10½ to 11 knots, with engines developing 500 horse-power, and burning 35 tons of coal a day, and working at 20 lb. pressure. This is the sort of thing "Weale's Series" gives us under the heading of "Modern Workshop Practice"! "*Ex pede Herculem.*" We turn over a page or two and find instructions for the making of marine boilers. There are pictures of square boilers, but the cylindrical type appears to be unknown to the illustrator of this "modern" work. Next, the boiler-maker is instructed as to the thickness of plates required, but whether the figures refer to iron or steel there is nothing here to show; and, again, iron seems to be thought the only possible material that a modern engineer is likely to use in engine-framings. The other details are on a par. Old-fashioned slot-links are illustrated, propellers are only shown with the blades cast solid on the boss, and no reference is made to manganese-bronze. Cast iron, again, seems to be thought the only material suitable for pistons, and so on to the end of the chapter, until we arrive at the subject of floating docks and the end of our patience.

If books of this class were only offered to grown men of experience, we should not consider it worth while to give space for their notice. Unfortunately, many young men, at the beginning of their career, are induced to spend money, which they can ill afford, by the specious promises of the title-page and publisher's advertisement. Such works as this, which is an example of too many in the "Weale's Series," are no credit to the author, certainly not to the publishers, nor, indeed, to the engineering Press, which ought to do more towards rendering their sale impossible.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

2,081, **Sharpening Saws, &c.** J. and J. Hill.

The machine which is the subject of this invention consists of a pillar, upon which is attached all the brackets and parts of the machine. Mechanical attachments and contrivances are provided for keeping the saw in place, and also for actuating small emery wheels, grinders, or milling tools. The bracket is also provided with a rack and pinion for raising and lowering purposes, as occasion requires.

3,821, **Paint Brushes.** W. F. Hurndall.

The object of this invention is the binding and bridling of brushes when new, to prevent them from being too flexible or spreading. At present the custom is to bind them round with string, but with this invention a metal shield is used, which is fixed by clips. The shield is made to curve a little off from the bristles at the edge, to prevent the edge of the shield from cutting the bristles.

15,058, **Valve Apparatus for Ventilation or Hot-air Supply.** W. Lönholdt (Berlin).

By this invention the apparatus can be used both for ventilating and for hot-air supply, without necessitating any change of form, but only requiring to be inverted, whereas in such apparatus as has been heretofore employed a change of form was required for adapting it to the one or the other purpose.

4,208, **Opening Doors Electrically or Pneumatically.** C. W. Thode.

The object of this invention is to facilitate the opening of doors from a central station. Bolts which are balanced by counter-weighted levers are held in position by a spring click, which is released by pneumatic or electrical agency. The doors are then opened by the action of weighted levers at the side. The doors may be reclosed and bolted by fixing the spring click again in position.

17,779, **Improvements in Filling used by Painters.** S. Downs and W. Greenwood.

In order to obtain a better surface, and to dispense with the labour of rubbing down, this inventor uses a compound of lead, dryers, gold size, and turpentine, mixed to a paste. This is put on with a broad-pointed knife, and levelled by a steel straight edge.

18,070, **Improved Chimney-pot.** T. A. Aldridge.

In the chimney-pot which is the subject of this patent, a combined double cone or partly conical and partly funnel-shaped enclosure, with movable flaps, surmount the pipe. By the position of the baffles and orifice the greatest draft is ensured.

18,766, **Fireproof Iron Buildings.** E. J. Weston (San Francisco).

This invention relates to a method of construction consisting of a comparatively light fireproof framework for buildings, wherewith, it is claimed, they may be safely erected to great heights without danger of the falling of the walls by reason of earthquakes or fire. Such structures can also suitably be built in locations where difficulty exists in finding a suitable foundation for heavy walls of masonry. The system is also specially adapted to the construction of tall towers, chimneys, &c. The uprights are formed of I beams of wrought iron, of diagonally-based frames or open panels of cast iron adapted to fit closely between the uprights and to be confined by the flanges thereof. Plates of channel beams bind, support, and strengthen the structure.

NEW APPLICATIONS FOR PATENTS.

Feb. 4.—1,937, W. Higgins, Preparing Slates for Building Purposes.—1,941, W. Longley, Fire-resisting Doors or Shutters.—1,945, A. Clifford, Ventilator.—1,952, J. Merryweather, Paving.

Feb. 5.—2,023, J. Johnson, Rain Water Down-spouts.—2,034, F. Scattergood, Indicator for Doors.—2,039, F. Self, jun., Window-fastener.—2,049, H. Young, Machines for Cutting Stone.—2,061, E. Edwards, Holding open Windows in any Position.—2,083, W. Thompson, Door Check and Spring.

Feb. 6.—2,121, G. Wright, Block Tile or Slab for Building Purposes, &c.—2,134, H. Enoch, Water-waste Preventers for Water-closets.—2,155, N. Sorensen, Door-locks, &c.

Feb. 7.—2,167, H. Waggett, Nails.—2,171, E. Lund, Bookcases.—2,207, J. Day, Syphon Flushing Apparatus for Water-closets.—2,237, C. Smith, Fastenings for Windows, &c.

Feb. 8.—2,254, W. Pearse, Window-catch.—2,257, A. Bostock, Window-sash Fasteners.—2,289, J. Homan, Fireproof Structures and Bricks for same.

Feb. 9.—2,308, R. Somerville, Combination Screw and Nail Dowel.—2,319, R. Livingston, Opening and Closing Casements, Skylights, &c.—2,321, P. A. Lerne, Sash or Window Fasteners.—2,347, J. Gunter and J. Langer, Girders and Channels.—2,353, J. Edwards, Sash Fasteners.

PROVISIONAL SPECIFICATIONS ACCEPTED.

17,949, R. Hudson, Hinges and Bolts for Gates and Doors.—18,482, G. and H. Schück, Artificial Stone, Cements, Plasters, &c.—18,507, J. Davis, Mitre Joinery Appliances.—18,552, A. Clifford, Testing Drain-pipes, &c.—18,606, D. Howarth, Lavatory Fittings, &c.—18,705, H. Condy, White Lead.—18,810, H. Faulkner, Imitation Polished Marbles, Granite, Tiles, &c.—18,865, T. Twyford, Water-closets.—18,893, C. Geen, Air-inlet Ventilators.—174, I. Birkett, Hoists or Lifts.—196, A. Vaigner, Hydraulic Lift or Hoist.—355, F. Trier, Machinery for Working Stone.—368, H. Crewe, Convertible Steps and Folding Ladder.—401, C. Elliott, Chimney-top Cowls.—469, G. Fry, Warming and Ventilating Houses, &c.—482, J. Tollerton and J. Darnley, Fasteners for Doors, &c.—589, J. Kemsley, Ventilating.—638, G. Jennings, Water-closet Valves.—694, R. Suter, Frost-proof Pipes, &c.—727, W. Thompson, Shutters for Windows, Doors, &c.—728, W. Thompson, Safety Bars for Doors, Windows, &c.—801, H. Hall, Tiles for Lining Walls, &c.—847, E. Edwards, Composition for Paint or Varnish.—907. J. Woodward, Securing Sash-lines to Sashes.—980, R. Hitchins, Construction of Ceilings.—1,025, E. Kingsnorth, Windows.—1,120, B. Smith and F. Taylor, Combination Tile and Gutter for Roofing.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

3,743, G. Garrard, Roofing, Wall, or Hanging Tiles, &c.—4,373, T. Twyford, Lavatory Basins, &c.—4,863, T. Wilson, Water-taps.—5,169, W. Bracewell and W. Hayhurst, Joiners' Cramps, &c.—5,363, S. Haseland, Woodworkers' Plane Irons.—7,594, G. Eland, Drying and Seasoning Timber, &c.—8,963, W. Sayer, Bricks, Tiles, &c.—16,737, T. Leblon, Mosaic Tile.—16,884, A. Del Guerra and D. Steffans, Securing Doors.—18,038, J. Strachan and J. Aleflect, Securing Sash-lines to Sashes.—18,708, E. Edwards, Waterproof Roofing Material.—18,767, T. Martin, Door Locks.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

FEB. 4.

By WOOLFOLD & HAYWARD (at Dover).

Dover—4, Compass-hill, freehold	£265
31, Commercial Quay, 61 years, ground-rent £2	200
Charlton—43, Peter-street, freehold	170
Ewell—Four freehold cottages	405
Buckland—5 and 6, Primrose-road, freehold	320

FEB. 11.

By WYATT & SON (at Chichester).

Chichester—Two freehold houses with shops	940
A freehold spirit store	1,160
Theatre-lane—Five cottages, 32 years, ground-rent 2s. 6d.	210

FEB. 12.

By WRIGHT & Co.

Spitalfields—The lease of 28, Brick-lane, term 9 years	295
Duckhead—The lease and goodwill of 283, Tooley-street, term 5½ years	255

By BOTCH & EVERS.

Hoxton—25 to 33, Newton-street, 47 years, ground-rent £30	2,005
108, 110, and 112, Horton-street, 80 years, ground-rent £72	1,505
13 to 21 odd, Emsworth-street, 20 years, ground-rent £31	610
14, 16, and 18, Alma-street, 40 years, ground-rent £15	1,005

FEB. 13.

By P. HODSON.

Stroud Green-road—Ground-rents of £17. 17s., term 78 years	295
King's-cross—16 and 18, Swinton-street, 53 years, ground rent £16	900
Mildmay Park—7 and 9, Jude-street, 44 years, ground-rent £8	480

By THOMAS & GRIFFIN.

King's-cross, Acton-street, and King's-cross-road—A moiety of an improved ground-rent of £100, term 45 years	635

By W. B. NICHOLAS.

West Kensington—19, Castlestown-road, 67 years, ground-rent £14	370

By D. YOUNG.

South Lambeth—187, South Lambeth-road, 78 years, ground-rent £12. 1s.	805
Denmark Hill, Olive-terrace.—Improved ground-rent of £6. 7s., term 93 years	120

By C. P. WHITELEY.

Swansea, near—The Landore Siemens Steel Works, with plant and machinery and leasehold land, together with the ironworks and collieries	101,000
Regent's Park—27, Redhill-street, 35 years, ground-rent £5. 12s.	210

FEB. 14.

By C. C. & T. MOORE.

Islington—10, Liverpool-street, 33 years, ground-rent £9. 15s.	240
Shadwell—6 to 11, Pope's-hill, 10 years, ground-rent £35	150

By H. J. BLISS & SONS.

Mile End—28 and 30, Sceptre-street, freehold	550

By E. STIMSON.

Brixton—112 and 114, Holland-road, 34 years, ground-rent £10. 10s.	335
Camberwell—121, 123, and 125, Neate-street, and 1 and 3, Herring-street, 25 years, ground-rent £22	310
Peckham—7 and 9, Beaufort-terrace, 48 years, ground-rent £10	375
61, Oakhurst-grove, 78 years, ground-rent £7. 10s.	230

MEETINGS.

SATURDAY, FEBRUARY 23.

Architectural Association.—Second Sessional Visit to various works in Charing Cross-road. (See advt.)

Builders' Foremen and Clerks of Works' Institution.—Annual Dinner, Holborn Restaurant. 6 p.m.

Royal Institution.—The Right Hon. Lord Rayleigh, M.A., F.R.S., on "Experimental Optics (Polarisation, Wave Theory)." 3 p.m.

Edinburgh Architectural Association.—Visit to Cramond Tower, Lauriston Castle, and Barnton Grounds.

MONDAY, FEBRUARY 25.

Royal Institute of British Architects.—Mr. T. M. Rickman, F.S.A., on "Writing a Specification." 8 p.m.

Surveyors' Institution.—Adjourned discussion on Mr. Josiah Hunt's paper on "Quantity Surveyors: their Duties, Rights, and Liabilities." 8 p.m.

Royal Academy (Lectures in Sculpture).—Mr. A. S. Murray on "Ancient Sculpture in Bronze: Statuary." III. 3 p.m.

Builders' Clerks' Benevolent Institution.—Annual Meeting. 7 p.m.

TUESDAY, FEBRUARY 26.

Society of Arts (Applied Art Section).—Mr. W. H. J. Weale on "English Bookbinding in the Reign of Henry VIII." 8 p.m.

Institution of Civil Engineers.—Further discussion on Mr. Gisbert Kapp's paper on "Alternate-Current Machinery." 8 p.m.

WEDNESDAY, FEBRUARY 27.

Carpenters' Hall (London Wall).—Professor W. Ramsay, F.R.S., on "The Ventilation of Buildings through their Walls." 8 p.m.

Society of Arts.—Mr. Alan S. Cole on "The Irish Lace Industry." 8 p.m.

St. Paul's Ecclesiological Society.—Rev. E. S. Dewick on "Christian Art on Coins from the time of Constantine the Great." 7.30 p.m.

Inventors' Institute.—8 p.m.

THURSDAY, FEBRUARY 28.

Society for the Encouragement of the Fine Arts.—Mr. C. Fleandes on "Religious and Arts of the Extreme Orient." 8 p.m.

Sanitary Institute.—Colonel W. Hope on "The Metropolitan Sewage Question." 5 p.m.

Society of Antiquaries.—8.30 p.m.

Friday, March 1.

Architectural Association.—Mr. J. T. Micklethwaite on "The Life of an Old Parish Church." 7.30 p.m.

Saturday, March 2.

Association of Public Sanitary Inspectors.—Sixth Annual Dinner, First Avenue Hotel, Holborn. 6 p.m.

Royal Institution.—The Rt. Hon. Lord Rayleigh, M.A., F.R.S., on "Experimental Optics (Polarisation; Wave Theory)." II. 3 p.m.

Miscellanea.

Foundations in Tunis.—The *Génie Civil* describes the foundations for buildings in modern Tunis, a section of the City which is built on marshy ground. The subsoil is an oozy sediment, largely deposited by the sewage water from the ancient, or Arab, quarter of the city, which is situated on an adjacent hill. This semi-fluid mud has a depth of about 33 ft. To prepare the soil for supporting an ordinary house, pits from 8 to 10 ft. square are excavated to a depth of about 10 ft., to the level of the ground water. A mixture is made of the excavated soil and powdered fat lime, procured from clinkers and unburnt stone from the lime-kilns, which soon crumbles to fine dust when exposed to the air. The mixture is thrown into the pits in layers about 1 ft. thick, and rammed down for a very long time by specially-trained labourers. A gang of fifteen or twenty men will work at least ten or twelve days ramming for the foundations of a moderate-sized house. An extremely hard bed is thus obtained, reaching to within 18 in. of the surface of the ground, and on this artificial bed the foundations of the building are laid. Although this method of construction is crude, it is stated that the practical results are superior to those obtained by using piles, concrete, or other recognised methods, and in all cases the cost is much less, for labour is cheap.

The Iron, Hardware, and Metal Trades' Pension Society.—Mr. Alexander Ritchie, of Messrs. Steven Bros. & Co., the London house of Messrs. McDowall, Steven, & Co., Milton Ironworks, Glasgow, presided at the thirty-third annual Ball in aid of this charity, which took place at Willis's Rooms, St. James's, on Thursday, the 14th instant. The company assembled numbered about 300. During the evening the announcement was made of contributions, collected by the chairman in aid of the fund, exceeding a hundred guineas. The piper boys of the Royal Caledonian Asylum gave a performance, and executed a series of national dances,—an innovation which met with warm approval. The Ball, instituted as an auxiliary to the parent fund, was originated thirty-two years ago, and has been the means of producing an aggregate of 2,200*l.*, from which source the executive have been enabled to relieve cases of urgency and distress to which the ordinary funds of the charity are inapplicable.

The English Iron Trade.—The English iron market preserves its favourable character. Pig-iron is still in a rising tendency. The Glasgow warrant market has been more active this week, and rates have been advancing. In sympathy with the tone of warrants, Scotch makers have put up their prices from 6d. to 1s. a ton; Cleveland iron is 6d. a ton higher, and has now risen 1s. within a fortnight. In other districts pig-iron is stiff, while Bessemer iron maintains its value well. Finished iron is unchanged, and, save for a reported drop of 2s. 6d. for common bars at Liverpool, which can only be considered temporary, seeing the strong position of crude iron, the market is very steady. The inquiry for tin-plates has somewhat revived. Steel still shows a strengthening tendency. Both blooms and slabs are quoted 5s. a ton higher, although trade is quiet. Shipbuilders and engineers are as active as ever.—*Iron.*

Sway (Hants).—A new chancel to the Church of St. Luke, at Sway, New Forest, Hants, was recently consecrated by the bishop of the diocese. The building, designed by Mr. Reginald G. Pinder, F.R.I.B.A., is Early English in style, with red brick copings and weatherings, the only stone used being Bath in the window tracery and finial of gable. The outside face, of red brick, is relieved with a diaper in grey headers, and the inside face is banded with red and yellow bricks and grey headers. The roof is an open-timbered one, covered with grey slates banded with green. The tile floors are by Carter, of Poole. The heating is by Porritt's patent. Messrs. Jenkins & Sons, of Bournemouth, are the builders.

Break of Railway Gauge.—A very noteworthy instance of the disadvantages which may be expected to result from the multifarious gauges adopted throughout the Indian railway system has just been reported, and it serves to illustrate how those disadvantages may be further felt as that system becomes extended. The remaining forty-three miles of the Nizam's State Railway now closely approach completion. This line will connect Banakala with Bezvada, the latter place being its terminus on the banks of the River Kistna. On the other side of that river there is the terminus of the Bellary-Kistna Railway, and within a very short time, therefore, passengers arriving by the latter railway will see just before them the commencement of a long stretch of line which only needs the bridging of the river to place them in communication with it. But although the construction of a bridge at that point is both practicable and easy, it will not be worth the while either of the Nizam or of the projectors of the Bellary-Kistna Railway to undertake this work, the Nizam's Railway being of a gauge much narrower than that of the other line. Through traffic is thus denied to all the goods carried by either railway, while passengers by one or the other of them must ferry across the river in order to continue their journey. While admitting that, perhaps, break of gauge in India has been a necessity, such an instance as this fully shows how unfortunate that necessity has been. The extension of Indian railways on such a system in the future must produce many similar results, and the fact should serve as a warning to those in other countries whose progress in railway construction has not yet forced upon them a knowledge of the inconvenience of break of gauge.—*Indian Engineer.*

Moving Buildings.—Rather less than a year ago, the Hotel Brighton, one of the largest hotels of Coney Island, New York, was bodily moved a distance of 120 ft. inland. The sea had made such encroachments upon the foreshore that the safety of the hotel was imperilled, and something had to be done. The hotel had a frontage of 400 ft., and covered an area of 92,000 square ft., the total weight of the building being 5,000 tons. It was lifted on to huge timbers, which rested on 120 railway cars. Six locomotives placed on parallel lines of rails gave a long pull and a strong pull, and the operation was completely successful. The success attending this removal has led to a repetition. Ocean House, another large hotel in the same island, two stories high, and 42 ft. by 55 ft., with a large piazza, was erected twenty years ago, and at that time stood 600 ft. back from high-water mark. The sea washed away the shore so rapidly that the hotel had to be placed on piles two years ago, and it was then considered safe. During a heavy easterly gale in the early winter, however, another slice of the beach was removed, and when the storm had subsided, the hotel was left behind in the Atlantic, some 50 ft. from the new shore, and standing upon its piles. It was at once decided to move it. Messrs. Louis Heinemann & Sons, Brooklyn, undertook the contract, and have just successfully removed the building some 300 ft. back from the beach, or 350 ft. in all. The plan of operation was as follows:—Rows of piles were sunk by hydraulic pressure under the hotel, and reaching to the shore. The piles were then capped, and heavy yellow pine sliding-ways were laid upon them. The hotel was raised upon these ways, and then pulled landwards by crabs on shore, and is now safely located on *terra firma* again.

Rigid Brass Glazing.—Mr. W. Gibbs sends us a specimen of stained glass set in brass instead of the ordinary leading, which he claims is stronger and lighter than lead, and safer for domestic windows, as not being liable to be cut into, and does not require saddle-bars. The window submitted to us, of the dimensions of 4 ft. by 2 ft., and mostly in small squares of 3 in. wide, is very rigid, and in this form the glazing answers well; but we think brass has been used in this way before. We doubt whether it would be as tractable and convenient as lead for the various curved lines required in high-class stained-glass design.

Patent Laws.—Under the title of "The True Position of Patentees," Mr. H. Moy Thomas has published, through Messrs. Simpkin, Marshall, & Co., a little book, in which the patent laws and regulations at home, abroad, and in our colonies and dependencies, are explained for the information of English inventors.

American Strikes and Lock-outs.—*Bradstreet's* (New York) reports that the labour troubles in the United States during 1888 were not so formidable as in the preceding year. The number of strikes and lock-outs reported was 679, involving 211,841 workmen, against 684 strikes and lock-outs, affecting 345,854 operatives, in 1887. Of the 1888 strikes, by far the larger number were, as in previous years, due to disputes arising out of the wages question, or disagreements as to working hours; the percentage of strikes in 1888 being 55, of strikers 68, as against 62 per cent. in both cases in 1887. Pennsylvania still shows the largest number of strikers,—about 45 per cent. in 1888, compared with 32 per cent. in the previous year. The time lost by strikers in 1888 aggregates 7,562,480 working days, against 10,253,921 days in 1887. The total loss of wages from strikes last year was 11,343,720 dols., against 15,380,881 dols. in the preceding year, a saving effected in 1888 of 4,037,161 dols., or 26 per cent.

The Norwegian Granite Industry.—The export of hewn granite from Norway has considerably increased of late years, several new quarries having been opened. The chief markets for this stone are England—principally London—and North Germany, the export to this country consisting wholly of kerbstone; whilst to Germany is also shipped finer cut stone for bridges, quay-making, &c. Last year a large quantity of the latter was shipped to Hamburg and Bremen for use in the new custom-houses and quays. In 1888 there were exported 36,000 tons of stone, dead-weight, valued at 40,000*l.* In 1887 the export was nearly the same. The demand for the London market remains small, and stocks are rather heavy.

Eastern Counties Asylum for Idiots, Colchester.—A new hospital for thirty-five patients, in connexion with the Eastern Counties Asylum for Idiots, has just been completed, from the designs, and under the supervision, of Mr. R. F. Vallance, architect, Nottingham. Mr. Vallance has been engaged during the last eight years in carrying out additions and alterations at the institution named, his designs for which were selected in open competition in 1881. The hospital building just completed formed no part of the competition scheme, Mr. Vallance receiving the commission for this work in 1887.

The New Swedish House of Parliament.—The programme for the competition for the new House of Parliament in Stockholm has now been issued. No estimates of cost are to be furnished by the competitors, the jury appointed making their own estimates on one common basis for all designs. However, the cost of the building itself is not to exceed 200,000*l.* The House of Parliament is to comprise four stories and an *entresol*, and the adjoining National Bank (included in the scheme) a similar number but all fireproof. Up to the present time thirty architects are said to have entered for the competition.

Spring Hinge.—Messrs. Moser & Sons have submitted to our notice a very powerful spring hinge for closing doors, which is also very simple in construction and operation, and has the advantage that it can be adjusted for greater power on becoming weakened by use. The inherent defect in all hinges into which springs enter is that they must necessarily become less effectual in time, except by such a readjustment as is provided for in the hinge here mentioned. This is made so that the door can be removed without unscrewing the hinge, by the removal of holding-pins on each side of the hinge.

Ovingdean, Sussex.—The Ovingdean Estate, near Brighton, is for sale. The property extends over about 350 acres of arable and down land, with farm-buildings, cottages, &c. Ovingdean House stands within a home-park of twenty acres, sheltered by the South Down range. Our readers will remember that here Harrison Ainsworth lays the plot of his Royalist novel, "Ovingdean Grange." The parish church was restored and reseated about twenty-one years ago.

Borough Surveyorship, Brighton.—We hear that Mr. G. R. Andrews has been appointed Borough Surveyor of Brighton, at a salary of 500*l.* per annum. Mr. Andrews has been for the last ten years Town Surveyor at Bournemouth, under the Improvement Commissioners. He has done a great deal of good work in that rising health-resort, and we congratulate him upon his new appointment.

Fireproof Stables, Cattle-Sheds, &c.—The number of fires in stables, cattle-sheds, &c., caused by lightning, railway-engines, &c., being disproportionately great in Denmark, and the loss of cattle in consequence heavy, a Danish architect, Herr Borring, has constructed some simple but effective fireproof buildings for such purposes. Between the iron or wooden beams of the roof and the covering of laths and straw generally used in northern countries he introduces a layer of dry blue clay, three inches in thickness, which has the effect of arresting the fire. At some experiments the other day the thatched roof was set on fire, and burnt away, but not a spark of flame, we are assured, penetrated inside.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Teak, E.I. load	9 0 0	14 0 0
Sequoia, U.S. foot cube	0 2 3	0 3 0
Ash, Canada load	3 10 0	5 0 0
Birch ,,	3 10 0	6 0 0
Elm ,,	4 0 0	5 0 0
Fir, Dantzic, &c.	2 0 0	4 0 0
Oak ,,	2 10 0	4 10 0
Canada	5 10 0	7 10 0
Pine, Canada red	3 5 0	4 0 0
,, yellow	3 10 0	5 10 0
Lath, Dantzic fathom	4 10 0	5 10 0
St. Petersburg	5 0 0	6 10 0
Wainscot, Riga, &c. log	2 15 0	4 5 0
,, Odessa, crown	2 15 0	3 5 0
Deals, Finland, 2nd and 1st...std.100	9 10 0	10 10 0
,, ,, 4th and 3rd	7 10 0	9 0 0
Riga	7 10 0	8 10 0
St. Petersburg, 1st yellow	11 10 0	15 0 0
,, 2nd ,,	9 10 0	11 0 0
,, white	8 10 0	10 10 0
Swedish	8 10 0	16 0 0
White Sea	9 10 0	17 0 0
Canada, Pine, 1st	16 0 0	26 10 0
,, ,, 2nd	11 0 0	17 10 0
,, ,, 3rd, &c.	8 0 0	10 10 0
,, Spruce, 1st	9 10 0	10 10 0
,, ,, 3rd and 2nd	7 0 0	8 10 0

TIMBER (*continued*).	£. s. d.	£. s. d.
Deals—New Brunswick, &c. std.100	6 15 0	8 15 0
Battens, all kinds	6 10 0	20 0 0
Flooring Boards, sq., 1 in., prepared, First	0 11 0	0 14 6
Second	0 8 0	0 10 9
Other qualities	0 5 6	0 7 9
Cedar, Cuba foot	0 0 4½	0 0 4½
Honduras, &c.	0 0 4	0 0 4½
Mahogany, Cuba	0 0 4½	0 0 6½
St. Domingo, cargo average	0 0 4½	0 0 6½
Mexican ,,	0 0 4½	0 0 5½
Tobasco ,,	0 0 5	0 0 6½
Honduras ,,	0 0 5	0 0 6½
Box, Turkey ton	4 0 0	12 0 0
Rose, Rio ton	13 0 0	19 0 0
Bahia	13 0 0	18 0 0
Satin, St. Domingo foot	0 0 6	0 1 0
Porto Rico	0 0 9	0 1 3
Walnut, Italian foot	0 0 4½	0 0 6½

METALS.		
IRON—Bar, Welsh, in London...ton	5 5 0	5 10 0
,, ,, at works in Wales ...	4 15 0	5 0 0
,, Staffordshire, in London ...	5 10 0	6 10 0
COPPER—		
British, cake and ingot ton	78 0 0	78 10 0
Best selected	78 0 0	79 0 0
Sheets, strong	90 0 0	0 0 0
Chili, bars	73 0 0	0 0 0
YELLOW METAL lb.	0 0 7	0 0 7½
LEAD—Sheet, English	14 0 0	0 0 0
SPELTER—		
Silesian, special ton	17 10 0	17 12 6
Ordinary brands	17 7 6	17 10 0
TIN—		
Straits ton	94 0 0	0 0 0
Australian	94 0 0	0 0 0
English Ingots	97 10 0	0 0 0
ZINC—English sheet ton	21 0 0	22 0 0

OILS.		
Linseed ton	18 17 6	19 0 0
Cocoanut, Cochin	27 10 0	29 0 0
Ceylon	26 10 0	36 15 0
Palm, Lagos	26 0 0	26 10 0
Rapeseed, English pale	31 0 0	0 0 0
,, brown	29 10	0 0 0
Cottonseed, refined	25 10 0	0 0 0
Tallow and Oleine	19 0 0	45 0 0
Lubricating, U.S.	6 0 0	6 0 0
,, refined	7 0 0	12 0 0
TAR—Stockholm barrel	1 2 0	1 2 6
Archangel	0 14 0	0 14 6

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Granite Gate Piers and Kerbing, &c.	Hammersmith Bur. Bd	H. R. Gough	Feb. 25th	xiv.
Reservoir and Laying Water Mains, &c.	Cheshunt Local Board	T. Bennett	Feb. 26th	xv.
Street Valves, Hydrants, &c.	do.	do.	do.	xv.
Works and Materials	Hammersmith Vestry	H. Mair	Feb. 27th	xiv.
Works and Materials	Kingston Highway Bd.	A. J. Henderson	do.	xv.
School Buildings	Blackburn School Com.	Smith, Woodhouse & Co.	Mar. 1st	xiv.
Works and Materials (Eastern R.E. Sub-Dist.)	War Department	*Official*	Mar. 4th	ii.
Works and Materials	Hendon Local Board	S. S. Grimley	do.	xv.
Roads and Sewers, Broomwood Park Estate	The Proprietors	W. N. Dunn	Mar. 5th	xiv.
New Sewer, &c.	Com. of H.M. Works	*Official*	do.	xiii.
Roadmaking Works	Lewisham Bd. of Wks.	do.	do.	xiii.
Articles and Works	Tottenham Local Bd.	J. E Worth	do.	xiv.
Road Materials	Cranbrook Rural S. A.	*Official*	do.	xiv.
Works and Materials	Fulham Vestry	do.	Mar. 6th	xiv.
Works & Materials (Weymouth R.E. Sub-Dist)	War Department	do.	do.	xiii.
Broken & Unbroken Stone for Macadamising	Hull Corporation	A. E. White	Mar. 7th	xv.
New Sorting Office, Plaistow	Com. of H.M. Works	*Official*	do.	ii.
County Police Station	Kent Justices of the County	do.	do.	xiv.
Works and Materials	Ealing Local Board	C. Jones	do.	xiv.
Works and Materials (Gosport R.E. Sub-Dist	War Department	*Official*	Mar. 8th	ii.
Sewers, Pumping Station, &c.	Met. Board of Works	do.	do.	ii.
Flint, Broken Granite, Glazed Pipes, &c.	Southgate Local Board	C. G. Lawson	Mar. 9th	xiv.
Roadmaking and Drainage	Stanford Estate, Hove, Brighton	C. Nye	do.	xv.
Well Sinking and Boring, &c.	Epsom Local Board	*Official*	do.	xiv.
Extension of Bridge, Lowering Hill, &c.	Cheddingfold Road Improvement Committee	Welman & Street	Mar. 11th	xiv.
Works and Materials (Newcastle Sub-Dist.)	War Department	*Official*	do.	xiii.
Works & Materials (Chatham R.E. Sub-Dist.)	do.	do.	do.	xiii.
Construction of Aqueduct	Manchester Corporation	G. H. Hill	Mar. 12th	xv.
Works and Materials (Plymouth Sub-Dist.)	War Department	*Official*	Mar. 13th	xiii.
Chancel, Transept, Tower, &c. to Church	...	Nicholson & Son	do.	xiv.
Works and Repairs to Buildings	Comrs. of H.M. Works	*Official*	Mar. 14th	xiii.
Sewerage Works	Willenhall Local Bd.	E. Baker	Mar. 16th	xv.
Waterworks	Uckfield Waterwks Co.	H. B. Nichols	Mar. 20th	xv.
New Chapel, Slough	The Trustees	A. B Pridmore	Mar. 23rd	xiv.
Alteration to Chapel, Biggleswade	...	Potts, Salman, & Hennings	Not stated.	xiv.
Removal of Dust and House Refuse	Acton Local Board	*Official*	do.	xiv.
Alterations and Additions to Schools	School Bd. for London	do.	do.	xiii.
Annual Repairs to Buildings and Furniture	do.	do.	do.	xiii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Assistant in Borough Engineer's Office	Nottingham Corporatn.	130*l.*	Feb. 27th	xix.
Surveyor and Inspector of Nuisances	East Barnet Valley L.B.	200*l.*	Feb. 28th	xix.
Architect	Leeds School Board	300*l.*	Mar. 1st	xix.
Leading Assistant (Engineering Dept.)	Manchester Corporation	200*l.*	Mar. 6th	xix.
Architect's Assistant and Junior ditto	Salvation Army	Not Stated	Not stated.	xix.

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *Noon on Thursdays.*]

ALTON (Hants).—Additions to "The Lodge," Alton. Mr. Arthur Vernon, architect, High Wycombe :—

Martin, Wells & Co.	£1,380 0 0
Gibson	1,370 0 0
Goddard	1,330 0 0
Woodbridge	1,290 0 0
Wheeler Bros.	1,278 0 0
Silver	1,253 0 0
Shearburn	1,138 0 0
Bottrill & Son (accepted)	1,075 0 0

BEDFORD.—For extension of sewering and road-making, Queen's Park Building Estate (second portion), for Mr. D. C. Preston. Mr. Richard Lund, surveyor, Bedford :—

Turner, Bedford	£1,150 0 0
Harrison, Bedford	937 0 0
Cotton, Bedford	914 0 0
Jackson, Leyton, E.	750 0 0
Laughton, Bedford (accepted)	749 0 0
White, Bedford (withdrawn)	719 0 0

BRISTOL.—For the erection of the tower, Clifton College. Messrs. E. J. Hansom and F. Bligh Bond, joint architects. Quantities supplied :—

H. A. Forse	£5,085 0 0
W. Church	5,048 0 0
J. Wilkins & Son	4,695 0 0
E. T. Hatherly	4,548 0 0
R. Wilkins & Sons	4,508 0 0
E. Clark	4,440 0 0
J. Parrott	4,429 0 0
A. J. Beaven	4,382 0 0
Stephens & Bastow	4,340 0 0
W. Cowlin & Son	4,209 0 0
H. J. Rossiter	4,117 0 0
T. R. Lewis (accepted)	3,908 10 0

CARMARTHEN.—For the erection of St. John's Church. Messrs. Middleton, Prothero, & Phillott, architects, of Cheltenham :—

Stephens, Bastow, & Co., Bristol	£3,080 0 0
Wm. Jones, Gloucester	2,870 0 0
G. Mercer, Llanelly	2,567 0 0
J. Williams, Knighton	2,550 0 0
J. Griffiths, Llanelly	2,532 1 0
B. Jenkins, Brecon	2,400 0 0
H. Welsh, Hereford	2,398 0 0
T. Collins, Tewkesbury	2,390 0 0
J. Hopkins, Cardiff	2,300 0 0
J. & D. Evans, Llandewi-Brefi*	2,145 12 0

* Accepted.

CATFORD.—For drainage works at Perry Hill, Catford, for the English Land and Investment Company (Limited). Mr. Thomas Dinwiddy, surveyor, 26, Basinghall-street, E.C. :—

T. D. Tong	£635 0 0
Kennard Bros.	577 0 0
F. P. Smith	563 0 0
W. & R. Mills	539 0 0
C. Killingback (accepted)	497 0 0

CHELMSFORD.—For New Cemetery Lodge, Rectory-lane, Chelmsford. Mr. Fred. Chancellor, architect :—

W. E. Letch, Braintree	£500 0 0
H. Potter, Chelmsford	475 0 0
J. Lummis, Chelmsford	471 0 0
W. Nunn, Chelmsford	454 0 0
Mrs. Moss, Chelmsford	446 0 0
Jas. Baker, Chelmsford (accepted)	399 0 0

CRICKLEWOOD.—For the erection of five shops in Edgware-road. Mr. Robert Burr, architect, 2, Glebe-place, Chelsea :—

R. & R. Mackley	£4,030 0 0

CROYDON.—For erecting shop at side of "Walpole Cottage," Whitehorse-road, for Mr. W. O. Little. Mr. J. M. Cable, architect :—

Smith & Bulled, Croydon*	£333 17 0

*Revised tender accepted

DIGSWELL (Herts).—For repairs to Digswell Rectory, Herts. Mr. Vinall, architect :—

Wells, Ayot St. Peter	£605 18 0
Miskin, St. Albans	577 0 0
Goldhawk, Kimpton	535 10 0
Rayment & Sons, Hertford	396 19 0
Rowe, Welwyn (accepted)	395 14 0

EAST KIRKBY.—For erection of two cottages, East Kirkby, for Mr. H. T. Beaumont. Mr. R. F. Vallance, architect, Mansfield (Notts) :—

C. Houldsworth, Huccnall Torkard	£293 0 0
H. Gilbert, East Kirkby	268 0 0
E. Cuddy, Mansfield	254 0 0
Tate & Hains, East Kirkby	240 15 0
S. Dudson, Mansfield	240 0 0
Cudworth & Boot, Sutton-in-Ashfield	228 0 0
Dennis & Evans*	223 2 0

*Accepted, subject to alterations.

HIGH WYCOMBE (Bucks).—For additions to Brands House, High Wycombe. Mr. Arthur Vernon, architect, High Wycombe :—

Woodbridge	£2,364 0 0
Fincher	2,316 0 0
Bottrill & Son	2,190 0 0
Grist	2,058 0 0
Green	1,960 0 0
Gibson	1,955 0 0
Biggs	1,929 10 0
Nash	1,878 0 0
Hunt	1,797 15 0
Flint & Maddeford	1,787 0 0
Loosley (accepted)	1,683 17 0

HORNSEY.—For the erection of two houses in Grenville-road. Mr. Robert Burr, architect, 2, Glebe-place, Chelsea :—

Wells & Son, Red Lion-st. (accepted)	£330 0 0

LONDON.—For first portion of the works for the Westinghouse Brake Company, Limited, at King's-cross. Mr. E. Dolby, 3, The Pavement, Willesden-green, architect :—

Patman & Fotheringham	£3,050 0 0
Higgs	2,940 0 0
J. T. Chappell	2,819 0 0
Cowley & Drake, Willesden-green*	2,749 0 0

* Accepted.

LONDON.—For alterations and additions to Nos. 300 and 301, Oxford-street, W., for Messrs. Helbronner, Limited. Mr. Albert E. Pridmore, architect, 2, Broad-street-buildings, E.C.:—

Taylor & Co.	£1,950	0	0 !
Hollingsworth	1,927	0	0
McCormick	1,925	0	0
Kilby & Gayford	1,907	0	0
E. Julian	909	0	0 !

LONDON.—For alterations at the Essex Arms, High-street, Aldgate, for Mr. Matchard. Mr. Geo. Treacher, architect, 30, Coleman-street, E.C.:—

Caton	£395	0	0
J. Beale, Westminster-bridge-road*	320	0	0
Smith & Appleton	318	0	0

* Accepted.

LONDON.—For alterations, repairs, and additions to No. 74, Lancaster-gate, W. Mr. W. Jacomb Gibbon, architect, 26, Great James-street, Bedford-row, W.C.:—

W. B. Head & Son	£549	0	0
Macfarlane Bros.	544	0	0
H. J. Chapman	533	0	0
E. L. Nunn (accepted)	516	0	0

LONDON.—For alterations, repairs, and bar fittings to "The Bickleigh" public-house, Vestry-road, Camberwell, for Mr. J. Lowry. Mr. John Reynolds, architect, 30, Camberwell-green, S.E.

Parker	£1,649	0	0
Bedmill	1,345	0	0
Drew & Cadman	1,337	0	0
J. & H. Cocks	1,257	0	0

LONDON.—For clearing the site and building a new Baptist Chapel in Castle-street, Oxford-street, London. Mr. Owen Lewis, architect, 79, Mornington-road, Regent's Park, N.W.:—

John Allen & Sons	£3,955	0	0
Geo. Foxley	3,900	0	0
Eli Tinson (accepted)	3,800	0	0

LONDON.—For the erection of new premises at 69, Westow-hill, Upper Norwood, for Messrs. Simmons & Sons. Mr. H. W. Pratt, architect. No quantities supplied:—

Bowyer & Son, Upper Norwood	£1,012	0	0
G. Jervis Smith, Streatham	974	0	0
Triggs, Clapham (accepted)	947	0	0

LONDON.—For alterations and additions to 74, Upper-street, Islington, N., for Messrs. Fenecti, Evans, & Co.:—

T. Andrew	£1,079	0	0
L. H. & R. Roberts	1,048	0	0
Wentner Smith & Co.	978	0	0
Brown & Harris (accepted)	954	0	0

LONDON.—For excavating for and forming concrete foundations for a group of industrial dwellings, to be erected in Brady street, Whitechapel. Messrs. N. S. Joseph & Smithem, architects, 45, Finsbury-pavement:—

Cattermole & Son	£2,465	0	0
Goodman	2,106	10	0
Fortescue	1,999	0	0

LONDON.—For alterations and extension of schools in rear of Hampden Chapel, Lauriston-road, Hackney. Mr. Robt. Burr, architect, 2, Glebe-place, Chelsea:—

F. G. Riggs	£871	0	0
Cox	870	0	0
G. W. Beale (accepted)	849	0	0

LONDON.—For sanitary and decorative repairs and additions at 26, Gilston-road, The Boltons, South Kensington, S.W. Mr. John Jackson Wheeler, surveyor, 189, Fulham-road, S.W.:—

J. Jones, Chelsea	£336	0	0
Scharien & Co., Chelsea	321	0	0
W. Park, Chelsea	286	10	0
Bovis & Co., New-street, Dorset-sq.*	283	0	0

*Accepted.

LONDON.—For alterations and additions to 3, Crosby-square, Bishopsgate. Messrs. N. S. Joseph & Smithem, architects, 45, Finsbury-pavement:—

Colls & Sons	£3,580	0	0
G. S. Williams & Son	3,115	0	0
Ashby Bros.	2,965	0	0

LONDON.—For alterations to the "Queen's Head," Strand, for Mr. F. Anstiss. Mr. R. E. Niblett, architect, Hackney, E.:—

Contract No. 1.

Wilkinson Bros. (accepted)	£76	0	0

Contract No. 2.

J. Anley (accepted)	282	10	0

LONDON.—For additional story at No. 158, North End-road, Fulham. Mr. Robt. Burr, architect, 2, Glebe place, Chelsea:—

Wells & Son, Red Lion-street (accepted)	£225	0	0

MANCHESTER.—For alterations to house, and additions of billiard-room and ferneries, for Mr. Hugh Rowland. Messrs. E. & F. Hewitt, architects, 9, Albert-square, Manchester. Quantities by architects:—

Simon Johnson	£698	0	0
Wm Brown & Son	697	0	0
R. Neill & Sons	693	0	0
Wilson, Toft, & Huntley	626	0	0
Owen Williams (accepted)	597	0	0
William Shaw	590	0	0

READING.—For small detached house at Caversham. Mr. Henry Gough, architect, Station-road, West Croydon:—

G. Wernham, Reading	£333	10	0
Simonds, Reading	329	0	0
W. Hawkins, Reading	315	0	0
W. Goodchild, Reading	245	0	0
Batley & Linfoot, Croydon	235	0	0

WATFORD (Herts).—For the erection of new bottling stores at 95, High-street, for Messrs. Durand, Sedgwick, & Bird, of Bedford-street, W.C. Mr. C. P. Ayres, architect, 52, High-street, Watford:—

Andrews & Sons	£670	0	0
C. Brightman	669	0	0
W. B. Neal	652	0	0
G. & J. Waterman	637	0	0
T. Turner, Limited	625	0	0
H. M. Dove (accepted)	597	10	0

[All of Watford.]

WIMBLEDON.—For building new house at Raynes Park, Wimbledon, for Mr. Fred. E. Weatherley. Mr. Geo. Sherrin, architect:—

J. Chapman, Hackney	£1,705	0	0

[No competition.]

WOKING.—For new house at Mount Hermon, Woking. Mr. W. I. Chambers, architect:—

Geo. Gray, Egham	£1,458	0	0
A. A. Gale, Woking	1,343	0	0
Martin, Wells, & Co., Aldershot	1,150	0	0
John Fuller, Ripley	1,060	0	0
Edgar Seaver, Godalming*	950	0	0
Chas. Ham, Woking (too late).			

* Accepted.

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